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December 23, 1996

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0000047

**RE: Revised Report  
On-Site Source Characterization and Off-Site Groundwater Investigation Report  
CAM-OR Site - Westville, Indiana  
Dames & Moore Job No. 13704-031-045**


Dear Mr. Gifford:

We are submitting herewith, on behalf of the CAM-OR Site Extended PRP Group, the corrected text, Tables 1 and 3, and all figures for the On-Site Source Characterization and Off-Site Groundwater Investigation Report, CAM-OR Site, Westville, Indiana dated December 13, 1996. These revised pages and figures are marked Revision 1, dated December 20, 1996. For convenience, we are furnishing the entire text, although only a few pages have been revised; the previous text should be discarded. We considered the revisions necessary to correct minor inconsistencies and clarify the presentation; they do not affect the conclusions of the report.

We apologize for any inconvenience. Should you have any questions or require additional information, please do not hesitate to contact either of us.

Very truly yours,

DAMES & MOORE

  
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GEV\WJB:kk

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PRP Technical Committee  
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**VOLUME I -**

**ON-SITE SOURCE CHARACTERIZATION  
AND OFF-SITE GROUNDWATER  
INVESTIGATION REPORT**

**CAM-OR SITE - WESTVILLE, INDIANA  
DECEMBER 13, 1996**



**DAMES & MOORE**

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**VOLUME 1  
ON-SITE SOURCE CHARACTERIZATION  
AND OFF-SITE GROUNDWATER INVESTIGATION  
WESTVILLE, INDIANA**

**prepared for**

**CAM-OR SITE EXTENDED PRP GROUP**

Dames & Moore Job No. 13704-031-045  
December 13, 1996



## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	ES-1
1.0 INTRODUCTION .....	1
2.0 SITE DESCRIPTION .....	3
2.1 LOCATION AND SURROUNDING AREAS .....	3
2.2 SITE HISTORY AND CURRENT STATUS .....	3
2.3 DESCRIPTION OF UNCONSOLIDATED DEPOSITS .....	5
2.4 DESCRIPTION OF BEDROCK .....	5
3.0 SOURCE CHARACTERIZATION .....	6
3.1 ON-SITE SOIL CHARACTERIZATION .....	7
3.1.1 Investigation Activities .....	7
3.1.2 Results of On-Site Characterization .....	7
3.2 OFF-SITE SOIL CHARACTERIZATION .....	9
4.1 BACKGROUND .....	10
4.2 MONITORING WELLS .....	11
4.2.1 Description of Monitoring Wells .....	11
4.2.2 Well Installation Methods .....	12
4.2.3 Horizontal Groundwater Flow .....	13
4.2.4 Monitoring Well Sampling Results .....	14
4.3 LATERAL EXTENT OF IMPACTED GROUNDWATER .....	15
4.3.1 Background and Purpose .....	15
4.3.2 Investigative Activities .....	15
4.3.3 Sampling Results .....	16
4.4 POTENTIAL GROUNDWATER RECEPTORS .....	17
4.4.1 Water Supply Well Survey .....	17
4.4.2 Supply Well Sampling Protocol and Analytical Procedures .....	17
4.4.3 Results .....	18
5.0 CONCLUSIONS .....	19

## **TABLE OF CONTENTS**

(continued)

### **VOLUME 1 - FIGURES**

Figure 1	Site Location Map
Figure 2	Vicinity Map
Figure 3	Site Source Characterization Sampling Locations
Figure 4	Site Source Characterization Summary
Figure 5	Generalized Subsurface Section A-A'
Figure 6	Generalized Subsurface Section B-B'
Figure 7	Generalized Subsurface Section C-C'
Figure 8	Generalized Subsurface Section D-D'
Figure 9A	Site Soil Concentrations - BTEX and TMB
Figure 9B	Site Soil Concentration - Benzene Related Constituents
Figure 10	Site Soil Concentrations - Non Petroleum VOCs
Figure 11	Site Soil Concentrations - PNAs
Figure 12	Groundwater Investigation Locations
Figure 13	Groundwater Elevation Map; December, 1995
Figure 14	Groundwater Elevation Map; March, 1996
Figure 15	Groundwater Elevation Map; August, 1996
Figure 16	March 1996 Monitoring Well Analytical
Figure 17	Location of Subsurface Sections E-E' and F-F'
Figure 18	Generalized Subsurface Section E-E' with Analytical Data
Figure 19	Generalized Subsurface Section F-F' with Analytical Data
Figure 20	Direct Push Groundwater Profiling December, 1995 - January, 1996
Figure 21	Vertical Aquifer Profiling Results for 1,4-Dioxane; June-September, 1996
Figure 22	Known Residential Wells in Relation to 1,4-Dioxane Detections

### **TABLES**

Table 1	Soil Sampling Results
Table 2	Groundwater Elevations
Table 3	Groundwater Sampling Results
Table 4	Mobile Laboratory Analysis

## **TABLE OF CONTENTS**

**(continued)**

**\*\* APPENDICES AND VOLUME II ARE NOT INCLUDED IN THE COPIES THAT ARE  
GOING TO THE STEERING COMMITTEE \*\***

### **APPENDICES**

Appendix A	Friedman & Bruya Report
Appendix B	Mobile Laboratory Data
Appendix C	Boring Logs
Appendix D	Site Soil Sample Logs
Appendix E	Data Logs
Appendix F	Well Construction Logs

### **VOLUME II - LABORATORY REPORTS (not included in all reports)**

1. On-Site Source Characterization Soil Analytical Results
2. December Vertical Aquifer Confirmatory Analytical Results
3. January Monitoring Well Analytical Results
4. March Monitoring Well Analytical Results
5. July Monitoring Well 4XD and 4D Analytical Results
6. Vertical Aquifer Profiling Analytical Results
7. Residential Water Supply Well Analytical Results
8. City Water Supply Well Analytical Results
9. Correctional Center Water Supply Well Analytical Results

## **EXECUTIVE SUMMARY**

Dames & Moore, on behalf of the CAM-OR Site Extended PRP Group (Group), and in response to requests by the U.S. Environmental Protection Agency (EPA), has completed a multi-phase soil and groundwater investigation in the vicinity of the CAM-OR Site (Site) in Westville, Indiana. The objectives of this effort, performed between December 1995 and September 1996, were as follows:

- Sample and analyze subsurface soils on-site in an effort to identify and characterize the potential constituents of concern detected in previous investigations by Dames & Moore and others;
- Install early detection monitoring wells (sentinel wells) between the Site and potential groundwater receptors south and southwest of the Site;
- Assess the extent of potentially impacted groundwater south and west of the Site; and
- Delineate the horizontal extent of 1,4-dioxane, the only constituent of concern detected in groundwater beyond the immediate vicinity of the Site.

The work was accomplished pursuant to the Limited Groundwater Investigation Work Plan (November 28, 1995) which was reviewed and approved by the EPA, and the Revised Limited Work Plan for Off-Site Groundwater Investigation and On-Site Source Characterization (June 4, 1996).

This investigation was conducted in phases and included:

- Soil sampling from 60 on-site locations; 182 samples were collected and screened, 30 were submitted for laboratory analysis;
- Soil sampling from two off-site locations for "fingerprint analysis";
- Vertical aquifer profiling by collecting 120 samples at 33 locations;
- Installing and sampling eight additional monitoring wells;
- Collecting 24 samples from the 22 monitoring wells associated with the Site; and

- Identifying potential groundwater receptors within an approximate one mile downgradient of the Site and sampling 16 water supply wells for volatiles, semi-volatiles and 1,4-dioxane, as appropriate.

Based on the results of this and previous investigations, Dames & Moore concludes the following:

- Visibly impacted soil is present under a large portion of the western half of the Site.
- Petroleum constituents (benzene, toluene, ethylbenzene, xylenes, tri-methyl benzene) are present on-site in the visibly impacted soil. Chlorinated and non-chlorinated solvents have also been detected on-site. Various polynuclear aromatic hydrocarbons (PNAs) are present, but only in the southwestern portion of the Site. 1,4-Dioxane was not detected in analyzed soil samples. However, the detection limit for 1,4-dioxane was elevated due to matrix interference.
- No constituents were detected in on-site soil samples at concentrations above the Indiana Department of Environmental Management's (IDEM's) Voluntary Remediation Program (VRP) risk-based cleanup criteria except for two compounds (tetrachloroethene and vinyl chloride) which were detected in one sample at concentrations slightly above their respective criteria.
- Visibly impacted soil was observed at four locations within 200 feet south and southwest of the Site. Results of "fingerprinting analyses" performed on samples from two of the four locations indicate the presence of petroleum hydrocarbons and similarity between the samples.
- Light Non-Aqueous Phase Liquid (LNAPL), not previously detected, has been found at MW-6, located 150 feet southwest of the Site.
- Groundwater flows southwesterly in a single, unconfined aquifer.
- Four compounds [benzene, cis-1,2-dichloroethene, trichloroethene, and bis (2-ethylhexyl) phthalate (BEHP)] have been detected in downgradient groundwater samples at concentrations above IDEM VRP residential groundwater criteria. The only one of these found distant from the Site was BEHP, a common sampling and laboratory artifact, which was detected sporadically and inconsistently and is not considered to be related to the Site.
- Analyses of groundwater samples from the sentinel well cluster installed between the Site and the Westville municipal supply well have not indicated the presence of any

constituent of concern. The only sporadic and inconsistent detection has been for BEHP, which is not considered to be related to the Site.

- A single constituent of concern, 1,4-dioxane, has been detected in groundwater samples collected at depth as far as approximately 3,000 feet southwest of the Site near the intersection of US 6 and SR 2. This compound, which does not have an IDEM standard, appears to be present in a laterally- and vertically-localized plume. It has not been detected in the shallow portion of the aquifer beyond the immediate vicinity of the Site. At some locations within the plume, concentrations increase with depth. The horizontal extent of the plume has not been completely defined, and it appears to be moving in a more southerly direction beyond the immediate vicinity of the Site.
- All potential groundwater receptors within one mile downgradient of the Site have been identified. The nearest downgradient water supply well is located approximately 1,800 feet from the Site. No Site-related constituents have been detected in any of the 15 water supply wells within one mile downgradient of the Site, plus the Correctional Center well located 1.25 miles from the Site.

## **1.0 INTRODUCTION**

This report presents the results of an on-site soil characterization and off-site groundwater investigation at the CAM-OR Site (Site) in Westville, Indiana. The investigation was performed between December 1995 and September 1996 by Dames & Moore on behalf of the CAM-OR Site Extended PRP Group (Group) pursuant to a November 28, 1995 Work Plan, as amended on June 4, 1996, and approved by the U. S. Environmental Protection Agency (EPA). The objectives of this investigation were to evaluate on-site soil in an effort to identify and characterize the potential source(s) of constituents previously detected in the groundwater, to assess the extent of impacted groundwater west and south of the Site, and to delineate 1,4-dioxane in groundwater.

This soil and groundwater investigation characterized and delineated volatile organic compounds (VOCs) and polynuclear aromatic compounds (PNAs) in on-site soil, and evaluated the extent of VOCs and semi-volatile organic compounds (SVOCs) in groundwater west, south, and southwest (downgradient) of the Site. The work was conducted in phases and consisted of soil sampling using direct push techniques, vertical aquifer profiling using direct push and drilling techniques, installation of new monitoring wells south and west of the Site, potable water supply well sampling, and monitoring well sampling.

The December 1995 to January 1996 investigative activities included screening shallow groundwater samples collected at depths of about 20 and 40 feet below ground surface south and west of the Site for VOCs to delineate the lateral extent of constituents detected in wells along the western border of the Site. This information was to be used to position two sentinel well clusters south and west of the Site for monitoring groundwater upgradient of local residences and the Westville municipal supply wells.

Vertical aquifer profiling performed during drilling for the sentinel monitoring well cluster, approximately 750 feet southwest of the Site detected 1,4-dioxane and other constituents. Since this location was not suitable for sentinel monitoring, the well cluster was relocated further southwest and additional vertical aquifer profiling was performed to define the plume. The horizontal extent plume from the Site has not been completely determined, but its cross-section has been defined and appears to be localized laterally and vertically.

Subsequent to the Group reporting the detection of 1,4-dioxane in groundwater at depth in December 1995, the EPA sampled the Westville Municipal Well No. 1 and analyzed it for VOCs and SVOCs. EPA determined that 1,4-dioxane was not present in the groundwater sample that was collected from Municipal Well No. 1. Dames & Moore, at the request of the Group, sampled both Well No.1 and Well No. 2. Neither these nor subsequent periodic samples have detected any VOC, SVOC, or 1,4-dioxane. Potentially impacted water supply wells downgradient of the Site in the vicinity of the defined plume were tested to confirm that 1,4-dioxane was not present.

The on-site source characterization study included collection of 182 soil samples from 60 direct push technique shallow probes. Samples were visually characterized and field screened with a photoionization detector (PID). Thirty of these soil samples were selected for VOC and PNA analysis based upon field screening. Two visibly impacted off-site soil samples were collected south of the Site, on either side of SR 2. These samples were sent to an off-site laboratory for "fingerprint" analysis using high-resolution gas chromatography.



## **2.0 SITE DESCRIPTION**

### **2.1 LOCATION AND SURROUNDING AREAS**

The Site is approximately a 15-acre parcel located on the north side of the town of Westville, LaPorte County, Indiana, as shown on Figures 1 & 2. The Site is bounded on the north by County Road 400 South, on the west by the abandoned CSX railroad right-of-way (ROW), on the south by SR 2, and on the east by two residences between the Site and US-421.

Land use to the north, east, and west is predominantly agricultural, with scattered residences and commercial establishments. The Town of Westville, the Westville Auto Salvage, and an industrial park that includes trucking, warehousing, and light manufacturing facilities are located south of the Site, across SR 2. Westville Correctional Center is located just over one mile south of the Site.

### **2.2 SITE HISTORY AND CURRENT STATUS**

The Westville Oil Division of CAM-OR, Inc. began operation as a lubricating oil refinery plant in approximately 1934. The facility operated continuously at the same location until February 21, 1987. The plant rerefined used lubricating oil for use in automotive and industrial grade lubricating oil blends. In addition to selling its product in bulk, the company also packaged motor oils at its Westville cannery.

CAM-OR, Inc. was a publicly-owned Indiana corporation with approximately 900 shareholders. In 1977, operating control of the company was purchased by a management group. The management group changed the rerefining process in 1978 to a modernized high vacuum distillation process and made numerous other design and structural changes within the plant. The company installed a modern biological wastewater treatment facility with the capability of processing 50,000 gallons of wastewater per day, including wastewater containing high biochemical oxygen demand (BOD) and phenol concentrations.

Prior to 1978, the company used several lagoons on the property for oil and water storage. Under the new management, three new 420,000-gallon tanks were built on the property to store used oil.

The lagoons were subsequently used to store wastewater during the startup of the wastewater treatment plant.

The facility had been inspected by Toxic Substances Control Act (TSCA), Resource Conservation and Recovery Act (RCRA) and National Pollutant Discharge Elimination System (NPDES) program representatives. The first on-site sampling by EPA was in June 1984. The EPA and the Indiana Department of Environmental Management (IDEM) assessed fines which were paid by CAM-OR, Inc. A consent agreement and final order were filed on July 16, 1986 for the closure of two liquid/sludge lagoons. The company did not implement the agreed actions, but rather stopped refining on February 21, 1987, and stopped operation in March 1987.

The EPA Emergency Response Branch asked the Technical Assistance Team (TAT) to conduct a site investigation because of the potential for an uncontrolled release of oil. The TAT conducted a site investigation on March 2, 1987, and concluded that the Site posed a significant threat to human health and the environment. A Removal Action Plan (RAP) was developed by TAT for EPA in February 1988, which included the following recommendations:

- Collect all oils within the lagoons and transfer to on-site storage tanks;
- Treat and discharge all water from the on-site lagoons;
- Solidify all remaining sludges, isolating all PCB from all non-PCB sludges; and
- Backfill all lagoons.

The EPA conducted removal activities during 1987 through 1989. Dames & Moore was retained by the Group in 1989 to conduct subsequent activities. Between 1989 and 1995, the following actions were completed by the Group:

- Removal of impounded surface water by treatment and discharge;
- Removal of tanked liquids by off-site disposal;
- On-site stabilization of sludge from tanks and an impoundment in the northeastern corner of the Site;

- Regrading, capping, and establishing a grass cover on the northern portion of the Site; and
- Installation of monitoring wells near the Site boundary and performance of periodic groundwater monitoring.

### **2.3 DESCRIPTION OF UNCONSOLIDATED DEPOSITS**

The Site is located near the edge of the Valparaiso Moraine and the Kankakee Outwash and Lacustrine Plain. A majority of the materials encountered during field work were typically composed of sand and gravel from outwash fans that are part of the Kankakee Outwash and Lacustrine Plain. Based upon published data and well logs, the total thickness of the unconsolidated deposits in the vicinity of the Site range between 150 to 200 feet. The USGS report entitled: *Hydrogeologic Atlas of Aquifers in Indiana, Water-Resources Investigations Report 92-4142, 1994*, indicates the depth to bedrock becomes shallower south and southwest of the Site.

Borings advanced during the field investigation encountered 0 - 10 feet of silty sand, underlain by fine to medium and sometimes coarse sand with interbedded gravel seams to depths explored of about 150 feet. The sand color ranged from brown to brownish yellow to gray to olive gray. Gravel seams ranged in thickness from a few inches to a few feet.

Well logs and drilling information obtained during this investigation indicate the Site to be underlain by a single hydraulic unit from the groundwater surface to the top of bedrock with no significant confining layer or aquitard. Groundwater flow in the area of the Site is to the southwest, with no significant vertical gradient.

### **2.4 DESCRIPTION OF BEDROCK**

Bedrock underlying Westville, Indiana is composed of Devonian and Mississippian Age shale of the Ellsworth Formation. Ellsworth shale is present above the Atrim shale in this area of Indiana. Shale was found at about 148 feet below ground surface in the abandoned MW-4 boring, located approximately 750 feet southwest of the site. The shale was a dark olive green in color and appeared to be Ellsworth shale, however it was not cored to determine whether it was bedrock or a boulder. The boring was terminated after encountering the shale.

### **3.0 SOURCE CHARACTERIZATION**

In 1995, at the request of the EPA, the Group agreed to complete a source characterization to identify and quantify chemical constituents present in on-site soils. Soil sampling was performed on-site to identify and evaluate areas containing detectable levels of VOCs or PNAs in soil (source characterization). On-site source characterization was completed under the revised June 4, 1996 Work Plan. The results of the soil sampling were compared to the Indiana Department of Environmental Management (IDEM's) Tier II health-based cleanup goals for subsurface non-residential soils (as specified in the Indiana VRProgram Resource Guide, July 1996).

The source characterization focused upon the northwestern quadrant of the Site and the area that reportedly received storm water flow in the southwestern quadrant of the Site. Limited sampling was performed in the eastern half of the Site since available information indicated that only limited rerefining activities occurred there and remediation had been performed at the former lagoon in the northeastern quadrant. Sampling locations are indicated on Figure 3, Site Source Characterization Sampling Locations.

VOCs, PNAs, tetrahydrofuran, 2-picoline, and 1,4-dioxane were selected as the target analytes for source characterization since these constituents had been detected at least once in off-site monitoring well sampling events.

The soil (source) characterization comprised the following:

- 182 soil samples were collected from 60 locations across the Site using direct push methods.
- 14 soil samples from the southwest quadrant of the Site were submitted for VOC and PNA analyses.
- 12 soil samples from the northwest quadrant of the Site were submitted for VOC and PNA analyses.
- Four soil samples from the eastern half of the Site were submitted for VOC and PNA analyses.

- Two off-site soil samples were collected for hydrocarbon fingerprint analysis.

The results of the on-site and off-site soil characterization are summarized on Figures 4 through 8, and are discussed separately below.

### **3.1 ON-SITE SOIL CHARACTERIZATION**

#### **3.1.1 Investigation Activities**

Site source characterization consisted of advancing 60 direct push probes to collect soil samples to the shallower of 16 feet or the water table. The probe locations are shown on Figure 3. Paramount Environmental Services of Portage, Indiana provided probe services to obtain samples under the supervision of Dames & Moore. Some probes were terminated due to refusal, particularly in the northwest quadrant of the Site. All collected samples were visually inspected and screened for VOCs using a Photovac® portable photo ionization detector (PID), and the information was recorded on boring logs. The soil sample interval exhibiting the highest field screening result from each probe location was trimmed to approximately six inches in length, capped, labeled and placed on ice in a cooler. Thirty of these soil samples were selected to provide a representative horizontal distribution and analyzed for VOCs, PNAs, and 1,4-dioxane.

All direct push holes were abandoned by sealing with granular bentonite.

#### **3.1.2 Results of On-Site Characterization**

Visibly impacted soil was identified in 44 of the 60 probes. This soil is darkly stained with a petroleum odor. The visibly impacted soil was identified in two large areas of the western half of the Site, and at one location in the eastern portion. The visibly impacted soil extended to the depth explored. These areas are depicted in plan view on Figure 4 and in subsurface sections on Figures 5 through 8. The boundaries of the areas known are an interpretation of information that is available.

The southwestern quadrant of the property is a low area which reportedly received storm water flow from the plant; the impacted soils were found 8 feet below ground surface. The northwestern quadrant is a hill that has been regraded to promote drainage and capped with a 2-foot thick layer

of clean, imported soil; the impacted soils were found at two or more feet below ground surface. Only one probe in the eastern portion of the Site encountered visibly impacted soil.

The chemical constituents detected in the impacted soil included VOCs and PNAs typical of petroleum-derived compounds. VOCs were detected in 21 of the 30 samples selected for chemical analysis (Figures 9A through 10 and presented in Table 1). PNAs were detected in eight of the 30 soil samples selected for chemical analysis (Figure 11).

BTEX and/or related constituents were detected (Figure 9A and 9B) with the following breakdown by location: 13 of the 14 samples from the southwest quadrant; 7 of the 12 samples from the northwest quadrant; and one of the four samples from the eastern half of the Site.

Thirteen non-petroleum related VOCs were detected (Figure 10). Four of these VOCs (acetone, methyl ethyl ketone, trichlorofluoromethane, and vinyl chloride) were detected in one sample each. Three VOCs (chloroethane; 4-methyl-2-pentanone; and carbon disulfide) were detected in two samples each. The other six VOCs are listed followed by the number of samples in which they were detected: 1,1-dichloroethane (9); cis-1,2-dichloroethene (8); tetrachloroethene (11); tetrahydrofuran (6); 1,1,1-trichloroethane (5); and trichloroethene (10).

Only four of the PNAs were detected. These are listed, followed by the number of samples in which they were detected: fluorene (2); naphthalene (8); phenanthrene (5); and pyrene (1). Samples with detectable PNAs were located only in the southwest portion of the Site.

None of the on-site soil samples contains BTEX at concentrations that exceed the IDEM VRP Tier II Criteria for subsurface non-residential soils. None of the PNAs were detected at concentrations exceeding their respective criteria. Only two non-petroleum VOC constituents, both detected in a sample obtained from 8-12 feet in DM-11, exceed their respective soil criteria. Tetrachloroethene was detected at a concentration of 9.90 mg/kg (versus 8.01 mg/kg) and vinyl chloride was detected at a concentration of 0.24 mg/kg [versus 0.13 mg/kg (Figure 10)]. No criteria exist for 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; n-butylbenzene; sec-butylbenzene; carbon disulfide; p-isopropyltoluene; n-propylbenzene; tetrahydrofuran; trichlorofluoromethane; trimethylbenzene isomers; and phenanthrene.

### **3.2 OFF-SITE SOIL CHARACTERIZATION**

Two visibly impacted off-site soil samples were submitted to Friedman & Bruya, Inc., Seattle, Washington for high resolution gas chromatography analysis to "fingerprint" the constituents in the soils. The samples were collected from P-17 and P-19, located just south of the Site. These sampling locations are shown on Figures 3 and 4. The off-site soils collected for "fingerprinting" analysis had the same visual appearance as the soils sampled on the Site.

The results of the fingerprinting analysis indicate the two samples have similar petroleum constituents. Some constituents appear to be fresh, others heavily degraded. The age of the impacted soil was estimated to be 5 to 20 years. The Friedman & Bruya report is provided as Appendix A.

Chemical constituents detected in P-17 contained three products: a light distillate such as Stoddard solvent or mineral spirits, a middle distillate such as diesel or heating oil, and a highly degraded or cracked product, such as heavy fuel oil, crude oil, or creosote. The light and middle distillates appeared to be unweathered in this sample. The Friedman & Bruya laboratory report includes a chromatogram with a distinct pattern of *n*-alkanes from C-9 to C-21. The chromatogram shows that a highly degraded or cracked product forms a broad band on the chromatogram from *n*-C-8 to *n*-C-32 with a maximum at *n*-C-22. Friedman & Bruya suspects that the degraded product is a weathered heavy fuel oil such as Bunker C, crude oil, or creosote.

Sample P-19 contained material similar to P-17, but the light and middle distillates were very degraded and the distinctive *n*-alkanes from C-9 to C-21 are not present. The heavily degraded fuel oil, crude oil or creosote is a larger fraction.

## **4.0 OFF-SITE GROUNDWATER INVESTIGATION**

### **4.1 BACKGROUND**

The off-site groundwater investigation was performed in phases during the period December 1995 through September 1996. It consisted of the following activities:

- Shallow groundwater sampling west and south of the Site using direct push techniques;
- Vertical aquifer profiling;
- Monitoring well installation and sampling; and
- Sampling of downgradient water supply wells.

Shallow groundwater samples were collected west and south of the site (P-series) and analyzed to delineate the lateral extent of VOCs in the groundwater potentially impacted by Site soils. Shallow groundwater sampling was performed in the field west of the Site and in the city of Westville south of the Site, using direct-push equipment advanced to depths of 20 and 40 feet to collect groundwater samples. These were analyzed by a mobile laboratory.

Deeper groundwater samples were collected from probes and boring locations (vertical aquifer profiling) near or hydraulically downgradient of the Site at the locations shown on Figure 12 using direct-push (designated P-series) or drilling equipment (designated MW-series). These were analyzed for VOCs using a mobile laboratory. Vertical aquifer profiling was performed to evaluate whether the proposed screened intervals of the well clusters would be appropriate. The results of the mobile laboratory analysis indicated one proposed sentinel well cluster (MW-4) required relocation, but the proposed screen intervals for the monitoring wells would be appropriate. The vertical aquifer profiling was expanded to the west and southwest to further evaluate the horizontal and vertical extent of VOCs, SVOCs, and 1,4-dioxane.



Eight monitoring wells in three clusters (designated MW-4, MW-5, and MW-6 ) were installed as part of the groundwater investigation. These included a two-well cluster to evaluate constituent concentrations immediately southwest of the Site and two, three-well clusters intended to provide sentinel monitoring upgradient of potential groundwater receptors.

A water supply well survey was conducted to identify potential downgradient groundwater receptors. Sixteen water supply wells were sampled during the period of May to October, 1996.

## **4.2 MONITORING WELLS**

### **4.2.1 Description of Monitoring Wells**

Twenty-two groundwater monitoring wells have been installed at locations shown on Figure 12. Monitoring wells have been installed by CAM-OR, Inc. (B-1, B-2, B-4), the EPA (EP-1, EP-2, EP-3), and the LaPorte County Health Department (LP-1, LP-2, LP-3). The Group has installed six wells in 1993 (MW-1S, MW-1D, MW-2S, MW-2D, MW-3S, and MW-3D) and eight wells as part of the current investigation (MW-4S, MW-4D, MW-4XD, MW-5S, MW-5 D, MW-5XD, MW-6S, and MW-6D).

All of the wells are constructed of 2-inch diameter PVC. The B-series, EP-series, and LP-series wells are shallow wells screened near or across the water table. The MW-series wells are coded to indicate the screened interval as follows: "S" wells have a 10-foot screen across the water table; "D" wells have a 5-foot screen set at 80 feet; and, "XD" wells have a 5-foot screen set at 150 feet.

Sentinel well clusters MW-4 and MW-5 each consist of three monitoring wells. The MW-4 cluster was installed as a downgradient sentinel well between the Site and water supply wells to the southwest. The MW-5 cluster is a sentinel between the Site and Westville Municipal Well No. 1. Well cluster MW-6 is a two-well cluster completed southwest of the Site to characterize constituents in groundwater immediately downgradient of the Site.

#### **4.2.2 Well Installation Methods**

This section discusses the installation methods for the new well clusters MW-4, MW-5, and MW-6. Each well cluster includes one shallow well with a 10 foot screen that intercepts the water table, an intermediate depth well completed to approximately 80 feet, and a deep well installed to a depth of 150 feet, all as proposed in the December 4, 1995 Work Plan. The intermediate and deep wells have 5 foot screens.

Prior to monitoring well installation, vertical aquifer profiling was performed at 10 foot intervals from the groundwater surface, approximately 20 feet bgs to a maximum depth of 150 feet bgs. Samples were analyzed for VOCs using a mobile laboratory. The upper portion of the profiling used direct push methods and were designated P-series. The maximum depth attained by direct push equipment was 110 feet at P-22. The remainder of the vertical aquifer profiling samples were collected using the drilling equipment. The following direct push probes were completed in conjunction with the respective monitoring well (in parenthesis) as follows: P-1/P-21 (MW-4A); P-7 (MW-5); P-16 (MW-6); and P-22 (MW-4). A target list of VOC constituents was selected based upon the previous detections in monitoring wells MW-1S, MW-1D, MW-2S, MW-2D, MW-3S, and MW-3D. Table 4 is the target list for mobile laboratory analysis. The results of the analyses are presented on Figures 18 through 20 and provided in Appendix B. The profiling samples collected during this phase were analyzed in accordance with EPA field methods for chemical analysis. Duplicate samples from approximately 10% of these samples were submitted to an off-site laboratory for analysis. The results of the duplicate laboratory analysis is included in Table 7.

The dual-wall, reverse circulation, air rotary, drilling technique, was used to install 7 of the 8 monitoring wells, and to obtain water samples below the direct push limits. MW-6S was installed using hollow-stemmed augers using conventional techniques. The reversed air system uses compressed air forced down the annulus of the dual-wall drill pipe to the drill bit to return soil cuttings and groundwater to the surface through the center of the drill bit and the drill rod. Soil cuttings exited the drill head through a 4-inch I.D. hose that discharged through a cyclone directly to a roll-off box. Cuttings were collected from the cyclone for visual classification to prepare boring logs (Appendix C). Vertical aquifer sampling was performed by collecting samples from within the drill pipe at 10-foot intervals starting at the maximum depth attainable by the direct push equipment.

Upon reaching the desired depth, an overwash casing was installed to the bottom of the borehole and the dual-wall drill rod was removed. The PVC well was installed through of the overwash casing. Sand was tremmied around and at least two feet above the screen. The annulus was grouted with bentonite slurry to within three feet of the surface during the removal of the overwash casing from the hole. A protective cover with locking cap was cemented in place to complete the installation. Well construction logs are provided as Appendix D.

#### **4.2.3 Horizontal Groundwater Flow**

Groundwater elevations were measured in December 1995, March 1996, and August 1996. Groundwater flow in the vicinity of the Site is to the southwest according to these groundwater level measurements. The groundwater flow direction is in general agreement with previous measurements collected in 1992, 1993, and 1994. Elevations varied up to nine feet across the approximately 6000 feet between LaPorte County Health Department monitoring wells LP1 and LP2. Groundwater measurements indicate little vertical gradient between shallow, intermediate, and deep monitoring wells. Generalized groundwater flow directions are depicted on Figures 13, 14, and 15. The data used to prepare these figures is provided in Table 5.

The groundwater gradient ranged between 0.0013 to 0.0015 over the three measurement dates. The depth to groundwater ranged from about 6 feet below ground surface (bgs) at MW-4S to about 38 feet bgs at LP-1. The fluctuation between measurements over time was about one foot. Groundwater elevations were not obtained from monitoring wells B-1, B-2, and MW-2D in December, or MW-5XD in August, because the protective outer casings were not able to be opened. These conditions have since been rectified.

LNAPL was observed in MW-6S during the August water level measurements; it was not present in January or March sampling events. An oil/water interface probe was utilized to measure 1.15 feet of a brownish-yellow, translucent LNAPL with a petroleum odor. Correcting for the presence of this LNAPL provides an equivalent water level elevation for MW-6S consistent with the general flow direction depicted on Figure 15.

#### **4.2.4 Monitoring Well Sampling Results**

Dames & Moore has performed one full round of groundwater sampling of all monitoring wells associated with at the Site. A summary of laboratory results is provided in Table 6 and presented on Figures 16, 18, and 19. All MW-series monitoring wells were sampled in January, 1996. The VOC results from wells MW-1S, MW-1D, MW-2S, MW-2D, MW-3S, MW-3D, MW-5S, MW-5D and MW-6S were rejected because of the inexplicable presence of TCE. These wells, plus MW4-D, MW4-XD, and MW6-D, were resampled and analyzed for VOCs and SVOCs in March, 1996. The results showed the TCE to be absent or greatly reduced, consistent with previous monitoring near the Site. Samples were collected and analyzed for SVOCs from MW-4D and MW-4XD in July, 1996 to provide additional information for the vertical aquifer profiling being performed downgradient. These and the March data demonstrated sporadic and inconsistent detections of BEHP.

The January sampling was performed in accordance with the Work Plan, as modified by the EPA. EPA required a limited purge method whereby the well is purged by pumping at a slow rate to remove water flowing horizontally through the screen. Dames & Moore proposed to sample the wells with a PVC disposable bailer after purging with a pump; however, EPA required that samples be taken from the pump discharge rather than from a bailer. TCE carryover apparently occurred in some of the samples despite the pump decontamination protocol. VOC analysis was performed on 26 samples, including two equipment blanks. Equipment blank #1 and equipment blank #2 contained TCE at concentrations of 1,600  $\mu\text{g/L}$  and 480  $\mu\text{g/L}$ . The samples which preceded equipment blank #1 had concentrations of TCE ranging from 600  $\mu\text{g/L}$  to 270  $\mu\text{g/L}$ . Dames & Moore, in consultation with the Group, determined that pump decontamination procedures were inadequate for the January 1996 sampling round. Consequently, in March 1996, Dames & Moore resampled TCE at MW-1S, 1D, 2S 2D, 5S, 5D, 6S and 6D, where TCE had been detected in January 1996. The samples were obtained by conventional purging with a pump, then sampling with a disposable bailer.

Concentrations of detected chemical constituents were compared with the IDEM Tier II VCP Criteria for groundwater in a residential land use scenario. The analytical sampling results and criteria are presented in Table 3. Only 4 compounds were detected above their respective criteria: benzene in MW-1S, MW-2S, and MW-3S; cis-1,2-dichloroethene at MW-1S and 3S; TCE at MW-1S, MW-2D,

and MW-6D; and BEHP at MW-1S, MW-4D, MW-4XD, MW-5D, MW-5XD, and MW-6D. BEHP, a common sampling and laboratory artifact, was sporadically and inconsistently detected in samples, and is not considered to be Site-related. IDEM has not established criteria for the following detected analytes: 2,4 dimethylphenol; methyl ethyl ketone; chloromethane; methylene chloride; tetrahydrofuran; methyl naphthalene; and, 1,4-dioxane.

1,4-Dioxane was the only Site-related constituent detected at MW-4D and MW-4XD, the most distant monitoring wells from the Site. Groundwater sample analyses indicate 1,4-dioxane to be present at shallow and intermediate depths adjacent to the Site (Figure 18 & Figure 19 at MW-2, MW-3 and B-4). However, further from the Site, 1,4-dioxane was found at a greater concentration at MW-4D and MW-4XD, but was absent in MW-4S. Additional vertical aquifer profiling was performed south and west of the Site to determine the extent of 1,4-dioxane in groundwater.

#### **4.3 LATERAL EXTENT OF IMPACTED GROUNDWATER**

##### **4.3.1 Background and Purpose**

Two supplemental groundwater investigations were performed. The first was to evaluate VOC impact in shallow groundwater adjacent to the Site. The second was to delineate the horizontal and vertical extent of the 1,4-dioxane plume identified during the monitoring well installation. 1,4-dioxane became the constituent of concern southwest of the Site since it was the only constituent detected beyond the MW-4 well cluster.

##### **4.3.2 Investigative Activities**

Direct-push shallow groundwater sampling and vertical aquifer profiling was performed at the P-series locations shown in Figure 20. Groundwater samples were collected at 10-foot or 20-foot intervals at locations west and south of the Site to delineate the extent of potentially Site-related constituents including 1,4-dioxane. Seventy-one samples were collected at 22 locations west and south of the Site in December 1995. Four of these locations were associated with monitoring wells and are discussed in Section 4.2.2. The remaining 18 locations were used to delineate the lateral extent of constituents of concern. During the period June to September 1996, 49 samples were collected at 14 locations southwest of the Site. Eight of the 14 sample locations were used to assess

the lateral extent of VOCs and SVOCs including 1,4-dioxane. The remaining six were used to assess the lateral extent of 1,4-dioxane only.

Vertical aquifer profiling was performed at seven locations, designated P-23 through P-30, during June and July starting at 60 feet (the depth at which tetrahydrofuran and 1,4-dioxane were detected off site) and typically sampled at 20-foot intervals to the limits of the equipment. P-26, located just northwest of the Westville Waste Water Treatment Plant (WWWTP), was sampled at 10 foot intervals and the odd numbered samples were archived at the request of the EPA. P-27 was completed immediately downgradient of the Site to vertically profile concentrations of VOCs and PNAs starting at a depth of 80 feet and continuing at 10 foot intervals to 150 feet. All groundwater samples were analyzed by off-site laboratories for VOCs by EPA SW-846 Method 8260 and SVOCs plus 1,4 dioxane by EPA SW-846 Method 8270.

The analytical results from P23 through P30 showed the need for additional vertical aquifer profiling to determine the lateral extent of 1,4-dioxane. Six additional direct push probes, designated P-31 through P-36, were completed in August and September at locations southwest of the site between the WWWTP and the Porter/LaPorte County line.

#### **4.3.3 Sampling Results**

The vertical aquifer profiling results are summarized on Figure 21. 1,4-dioxane concentrations appear to increase with depth distant from the Site. The plume appears to be relatively localized laterally and vertically, and appears to be turning in a southerly direction. The horizontal extent of 1,4-dioxane has not been completely defined.

Analytical results from P-24, P-25, P-26 (first phase), and P-36 (second phase) indicated that 1,4-dioxane was present at the maximum depths explored, up to 110 feet as far as 3,000 feet from the Site, at P-36. In all four probe locations, the highest concentrations of 1,4-dioxane were detected in the deepest sample intervals. 1,4-Dioxane was detected at relatively consistent levels between 80 and 150 feet deep near the site at P-27. Nine other locations were sampled to a maximum depth of 100 feet with no detections for VOCs, SVOCs, or 1,4-dioxane. The direct push technique was not able to penetrate the full vertical extent of the aquifer southwest of the Site.

#### **4.4 POTENTIAL GROUNDWATER RECEPTORS**

##### **4.4.1 Water Supply Well Survey**

A door-to-door water supply well survey conducted in May, 1996 identified sixteen water supply wells servicing potential groundwater receptors south and west of the Site. They include two municipal wells, three private supply wells, seven commercial wells, and four residential wells. The locations of the water supply wells are shown on Figure 22. All of the residential and commercial wells reportedly are reportedly screened at 75 feet or less.

Eleven wells were sampled between March and May 1996. The remaining five wells were sampled in July and October, 1996. All sampling was performed jointly with the LaPorte County Health Department.

##### **4.4.2 Supply Well Sampling Protocol and Analytical Procedures**

Water supply well samples were analyzed for VOCs, SVOCs, and 1,4 dioxane, depending on the location of the well. Westville's two municipal wells and seven of the commercial and residential wells were analyzed for VOCs, SVOCs, and 1,4-dioxane. The remaining seven wells were analyzed for 1,4-dioxane only because vertical aquifer profiling distant from the Site indicated it to be the only compound present.

The following well sampling protocol was followed for water supply well sampling:

- Water softeners, activated carbon, or other treatment systems were bypassed prior to purging;
- Water was drawn from the faucet or spigot for at least 15 minutes to remove stagnant system water;
- All samples were collected from a faucet or spigot and placed directly into laboratory-supplied 40 mL VOA vials; and

- All samples were shipped the same day of collection to a qualified laboratory.

#### **4.4.3 Results**

A summary of the laboratory analysis and the location of all known potentially impacted water supply wells is shown on Figure 22. All water supply well samples were below method detection limits with the exception of the Smith residence, which indicated the presence of methyl ethyl ketone at 31  $\mu\text{g/L}$ . A new well and new internal PVC plumbing had recently been installed at the Smith residence. Methyl ethyl ketone is a common component of PVC cement and its presence is not considered to be Site related. Pertinent sampling information and results are provided in Table 3.



## **5.0 CONCLUSIONS**

Based upon Dames & Moore's investigative results and subsequent evaluations, the following conclusions are provided:

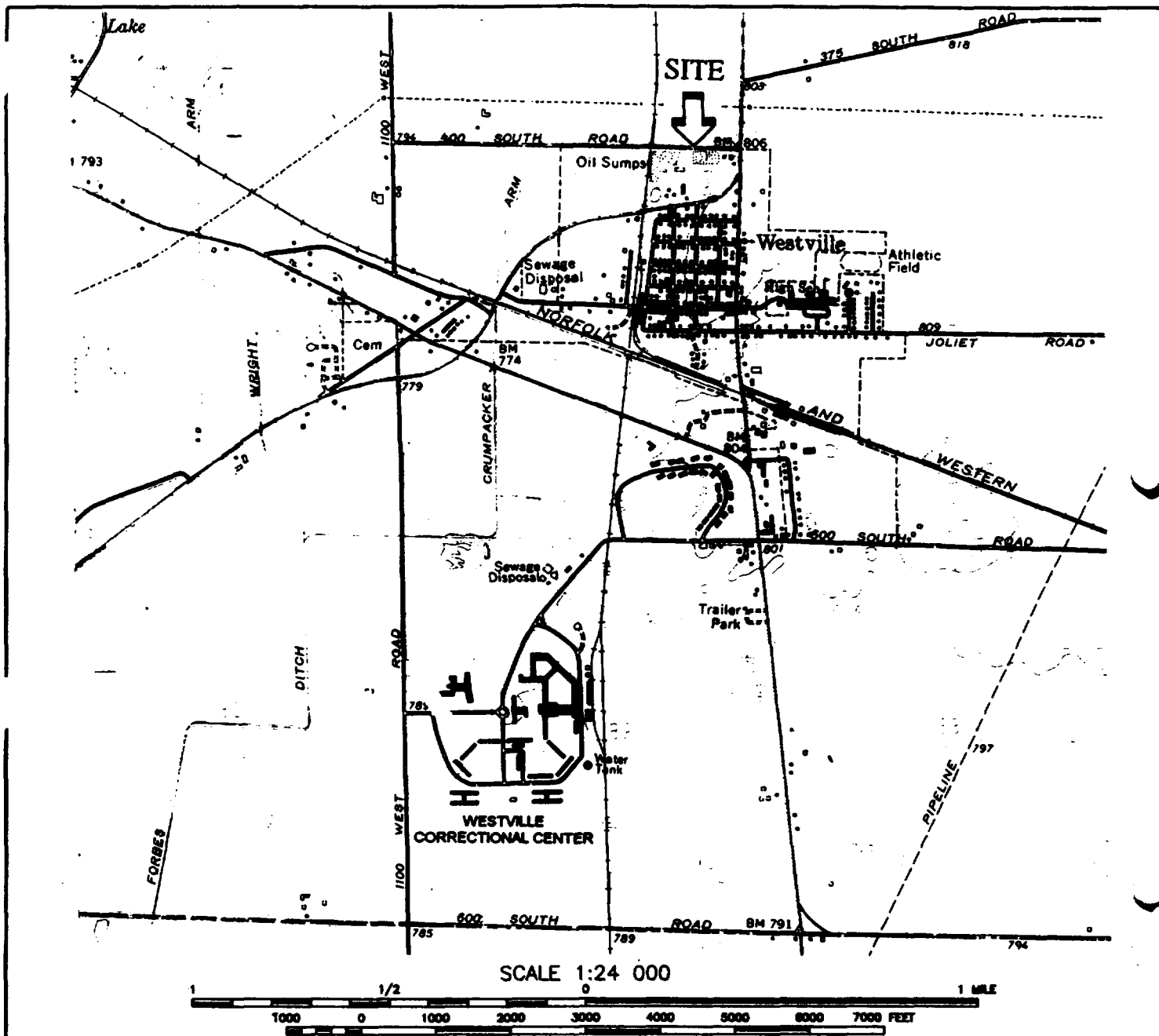
### **On-Site Source Investigation**

- Visibly impacted soil is present under a large portion of the western half of the Site.
- Petroleum constituents (benzene, toluene, ethylbenzene, xylenes, tri-methyl benzene) are present on-site in the visibly impacted soil. Chlorinated and non-chlorinated solvents have also been detected on-site. Various polynuclear aromatic hydrocarbons (PNAs) are present, but only in the southwestern portion of the Site. 1,4-Dioxane was not detected in analyzed soil samples. However, the detection limit for 1,4-dioxane was elevated due to matrix interference.
- No constituents were detected in on-site soil samples at concentrations above the Indiana Department of Environmental Management's (IDEM's) VRP risk-based cleanup criteria except for two compounds (tetrachloroethene and vinyl chloride) which were detected in one sample at concentrations slightly above their respective criteria.
- Visibly impacted soil was observed at four locations within 200 feet south and southwest of the Site. Results of "fingerprinting analyses" performed on samples from two of the four locations indicate the presence of petroleum hydrocarbons and similarity between the samples.

### **Off-Site Groundwater Investigation**

- Light Non-Aqueous Phase Liquid (LNAPL), not previously present, has been observed at MW-6, located 150 feet southwest of the Site.
- Groundwater flows southwesterly in a single, unconfined aquifer.
- Four compounds [benzene, cis-1,2-dichloroethene, trichloroethene, and bis (2-ethylhexyl) phthalate (BEHP)] have been detected in downgradient groundwater samples at concentrations above IDEM VRP residential groundwater criteria. The only one of these found distant from the Site was BEHP, a common sampling and laboratory artifact, which was detected sporadically and inconsistently and is not considered to be related to the Site.

- Analyses of groundwater samples from the sentinel well cluster installed between the Site and the Westville municipal supply well have not indicated the presence of any constituent of concern. The only sporadic and inconsistent detection has been for BEHP, which is not considered to be related to the Site.
- A single constituent of concern, 1,4-dioxane, has been detected in groundwater samples collected at depth as far as approximately 3,000 feet southwest of the Site near the intersection of US 6 and SR 2. This compound, which does not have an IDEM standard, appears to be present in a laterally- and vertically-localized plume. It has not been detected in the shallow portion of the aquifer beyond the immediate vicinity of the Site. At some locations within the plume, concentrations increase with depth. The horizontal extent of the plume has not been completely defined, and it appears to be moving in a more southerly direction beyond the immediate vicinity of the Site.
- All potential groundwater receptors within one mile downgradient of the Site have been identified. The nearest downgradient water supply well is located approximately 1,800 feet from the Site. No Site-related constituents have been detected in any of the 16 water supply wells within one mile downgradient of the Site, plus the Correctional Center well located 1.25 miles from the Site.



**FIGURE 1  
SITE LOCATION MAP**

**CAM-OR SITE  
ON-SITE SOURCE CHARACTERIZATION AND OFF-SITE  
GROUNDWATER INVESTIGATION REPORT  
WESTVILLE, INDIANA**

DATE:  
Dec.12, 1996

JOB NO.:  
13704-031-045

DRAWN BY: CHR'D BY:  
FMR WJB

REVISION:  
#1 DEC.20, 1996

**DAMES & MOORE**

A DAMES & MOORE GROUP COMPANY

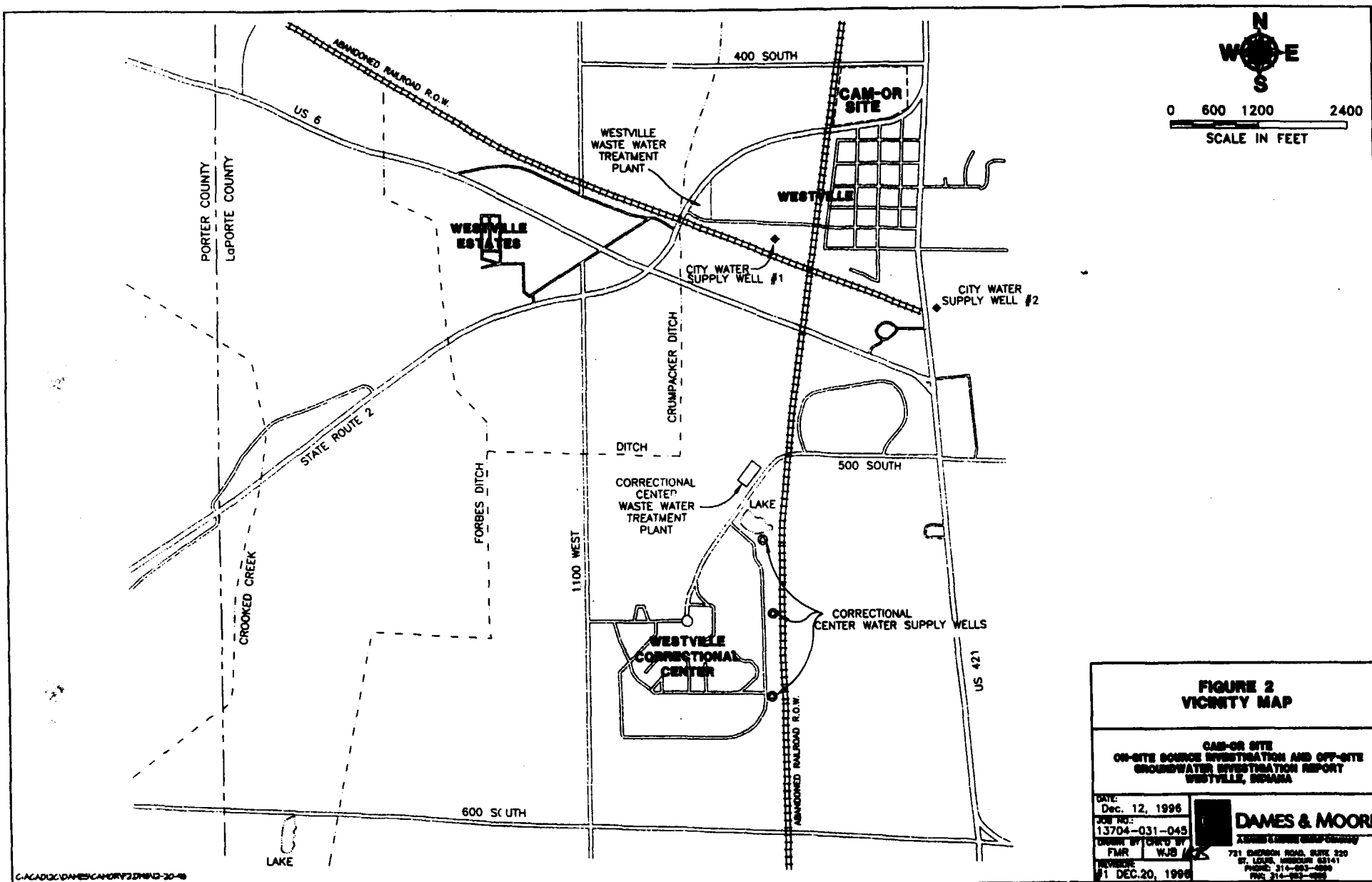
721 EMERSON ROAD, SUITE 220  
ST. LOUIS, MISSOURI 63141  
PHONE: 314-993-4888  
FAX: 314-993-4886

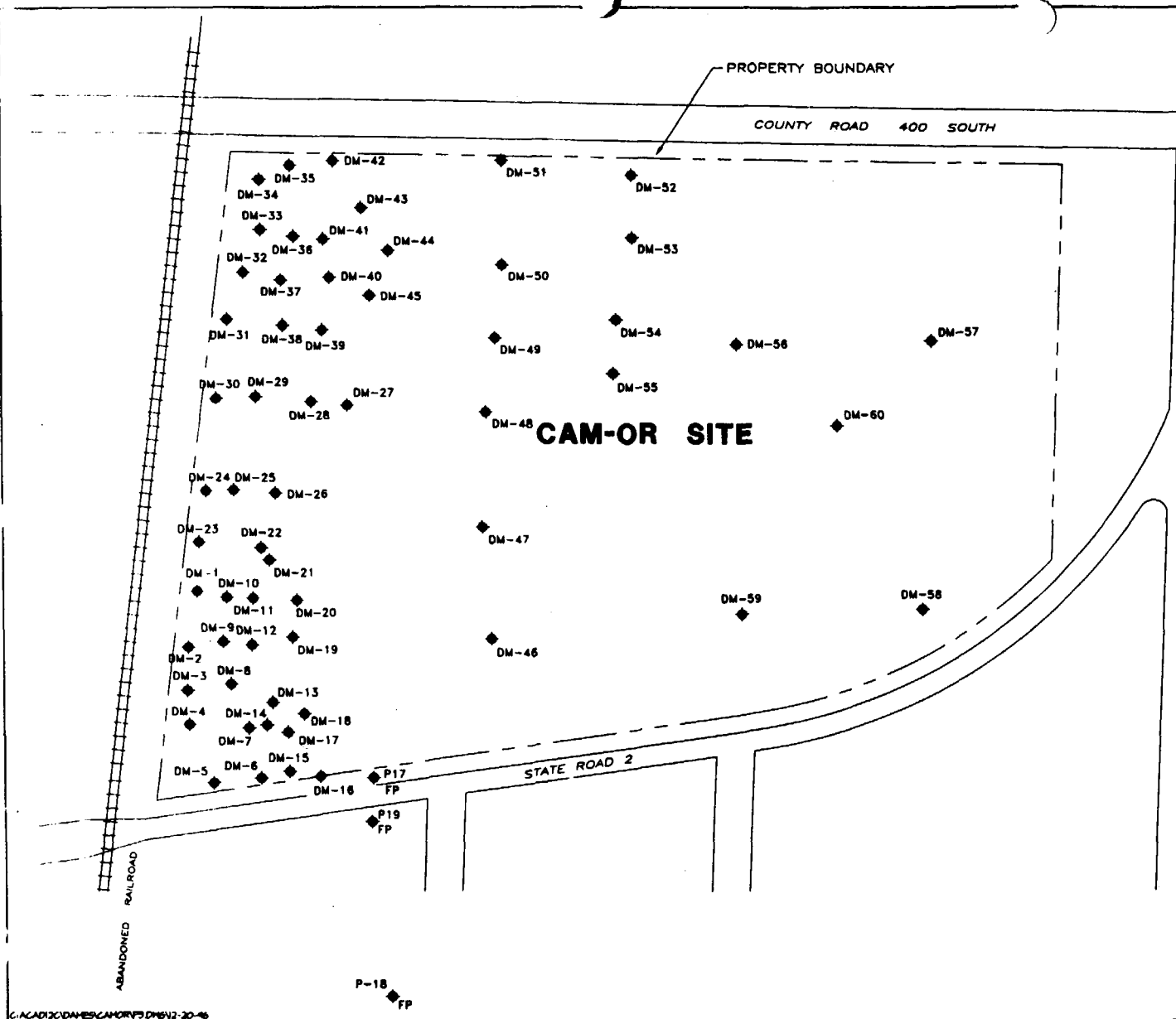


QUADRANGLE LOCATION

IAP REFERENCE:  
USGS QUADRANGLE MAP, 7 1/2 MINUTE SERIES  
WESTVILLE, IND., 1968, PHOTOINSPECTED 1977.

C:\ACAD12C\DAMES\CAM-OR\F1.DWG\12-20-96





C:\ACAD\DM\CAM\OR\DM60-20-46



0 60 120 240  
SCALE IN FEET

NOTE: SAMPLING LOCATIONS SURVEYED,  
SYMBOL LOCATIONS MAY VARY FROM  
ACTUAL LOCATION

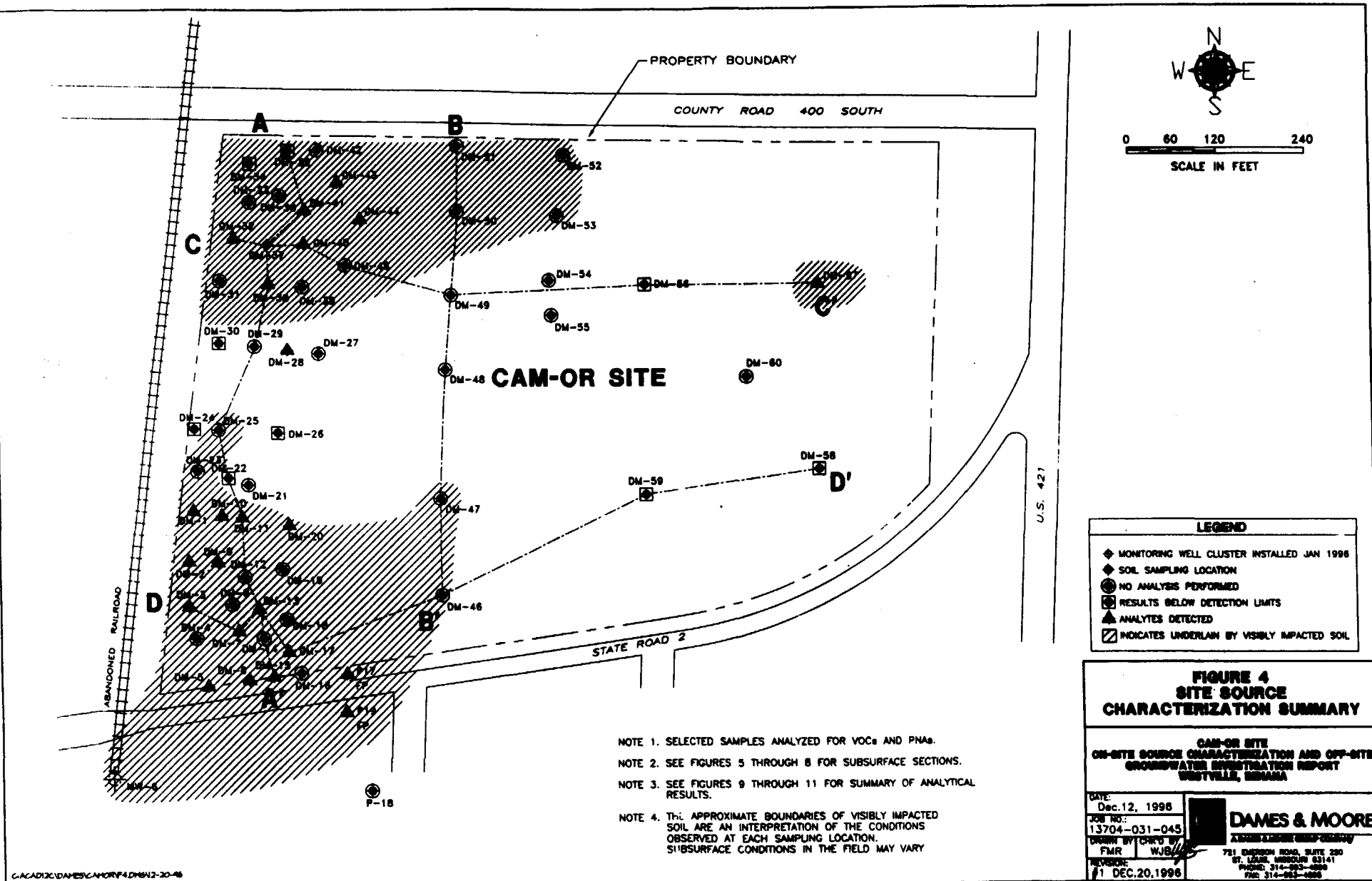
LEGEND	
◆	FINGERPRINT SAMPLE
◆	SOIL SAMPLING LOCATION

### FIGURE 3 SITE SOURCE CHARACTERIZATION SAMPLING LOCATIONS

CAM-OR SITE  
ON-SITE SOURCE CHARACTERIZATION AND OFF-SITE  
GROUNDWATER INVESTIGATION REPORT  
WESTVILLE, INDIANA

DATE:  
Dec. 12, 1996  
JOB NO.:  
13704-031-045  
DRAWN BY: CWS BY  
FMR WJB  
REVISION:  
11 DEC. 20, 1996

**DAMES & MOORE**  
721 BUSHY ROAD, SUITE 220  
ST. LOUIS, MISSOURI 63141  
PHONE: 314-963-6000  
FAX: 314-963-4800



**NORTH**

**A**

DM-41

DM-37

2-FOOT THICK  
SOIL CAP

DM-29

4' - 8'	0.006
B-BUTYLARZENE	0.001
B-PROPYLARZENE	0.10
1,2,4-TRIMETHYLARZENE	0.41
ATLANS	0.25

4' - 8'	0.21
B-BUTYLARZENE	0.06
1,1-DICHLOROTOLUENE	0.13
P-ISOPROPYLTOLUENE	0.83
METHYL ETHYL KETONE	1.5
1,1-DICHLOROETHANE	0.76
1,1-DICHLOROPENTANE	1.1
1,1-DICHLOROBUTANE	1.1
BENZENE	0.39
ETHYLARZENE	1.3
TOLUENE	1.3
1,2-TRIMETHYLARZENE	0.79
1,2,4-TRIMETHYLARZENE	4.8
ATLANS	1.4
	5.7

8' - 12'	0.44
B-BUTYLARZENE	0.16
1,1-DICHLOROTOLUENE	3.0
66-1,6-DICHLOROTOLUENE	3.0
P-ISOPROPYLTOLUENE	0.5
B-PROPYLARZENE	1.80
1,1-DICHLOROBUTANE	0.9
1,1-DICHLOROPENTANE	0.9
1,1-DICHLOROBUTANE	0.11
1,1-DICHLOROPENTANE	0.24
BENZENE	0.87
ETHYLARZENE	6.1
TOLUENE	19.0
1,2-TRIMETHYLARZENE	24
1,2,4-TRIMETHYLARZENE	36
ATLANS	68
PERMANTHENE	19

12' - 16'	0.36
B-BUTYLARZENE	0.27
1,1-DICHLOROTOLUENE	0.86
P-ISOPROPYLTOLUENE	0.46
METHYL ETHYL KETONE	0.86
1,1-DICHLOROBUTANE	4.8
1,1-DICHLOROPENTANE	1.9
ATLANS	1.9

8' - 12'	0.006
B-BUTYLARZENE	0.13
B-PROPYLARZENE	0.087
1,1-DICHLOROTOLUENE	0.53
ETHYLARZENE	0.10
1,1-DICHLOROBUTANE	0.11
1,1-DICHLOROPENTANE	0.18
1,2,4-TRIMETHYLARZENE	0.31
ATLANS	200
PERMANTHENE	48

**SOUTH**

**A'**

DM-11

DM-12

DM-13

DM-14

DM-15

12' - 16'

ELEVATION (USGS)

LEGEND

- SILTY SAND
- SILTY CLAY
- VISIBLY IMPACTED SOIL
- END OF PROBE-REFUSAL
- END OF PROBE-GROUNDWATER OBSERVED
- END OF PROBE-16 FOOT DEPTH

NOTE 1 CONTINUOUS SAMPLES WERE COLLECTED USING DIRECT PUSH EQUIPMENT, VISUALLY INSPECTED, AND SCREENED USING A PID (PHOTO-IONIZATION DETECTOR).

NOTE 2 INDICATES SAMPLING INTERVAL ANALYZED FOR VOCs AND PNA AT AN OFF-SITE LABORATORY. LABORATORY RESULTS ARE IN mg/kg.

NOTE 3 SOIL CAP MATERIALS OBTAINED FROM AN OFF-SITE SOURCE.

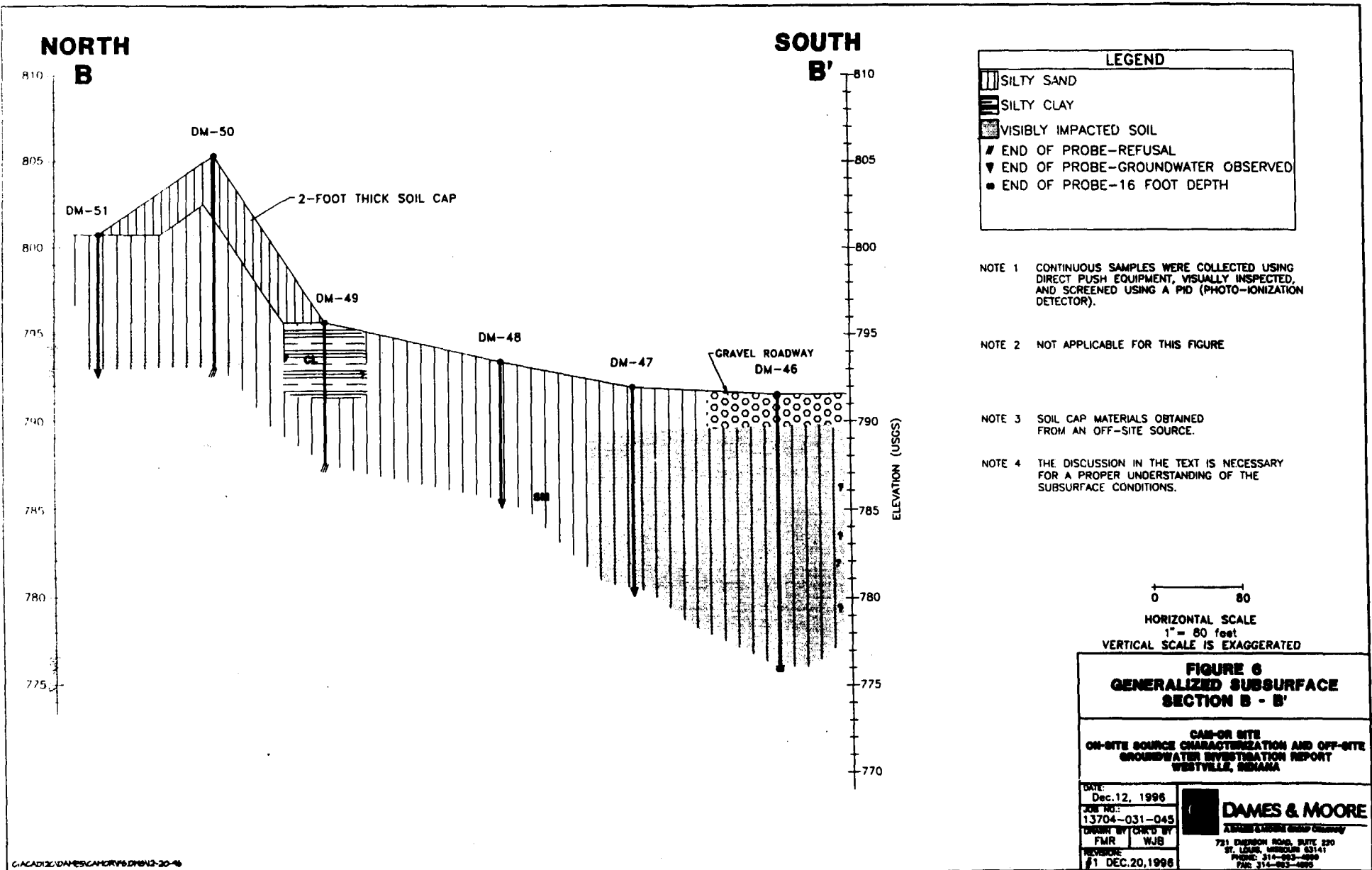
NOTE 4 THE DISCUSSION IN THE TEXT IS NECESSARY FOR A PROPER UNDERSTANDING OF THE SUBSURFACE CONDITIONS.

0 80  
HORIZONTAL SCALE  
1" = 80 feet  
VERTICAL SCALE IS EXAGGERATED

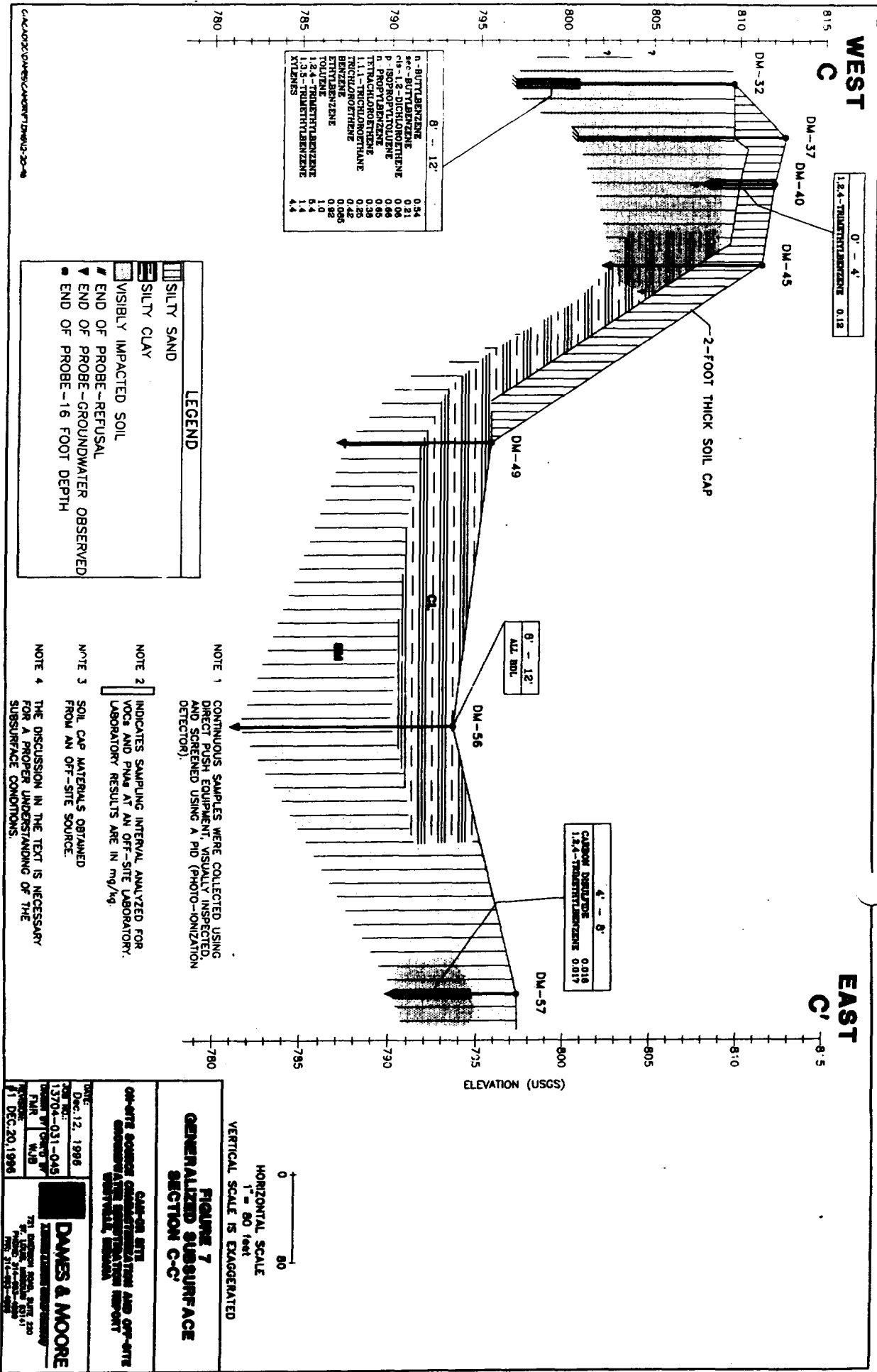
**FIGURE 8  
GENERALIZED SUBSURFACE  
SECTION A-A'**

ON-SITE SOURCE CHARACTERIZATION AND OFF-SITE  
GROUNDWATER INVESTIGATION REPORT  
WESTVILLE, INDIANA

DATE: DEC 12, 1996  
DRAWN BY: JCM  
CHECKED BY: WAB  
PROJECT NO.: 13704-031-045  
DAMES & MOORE  
735 LEXINGTON AVENUE, SUITE 400  
NEW YORK, NY 10017  
PHONE: 212-451-4000  
FAX: 212-451-4001

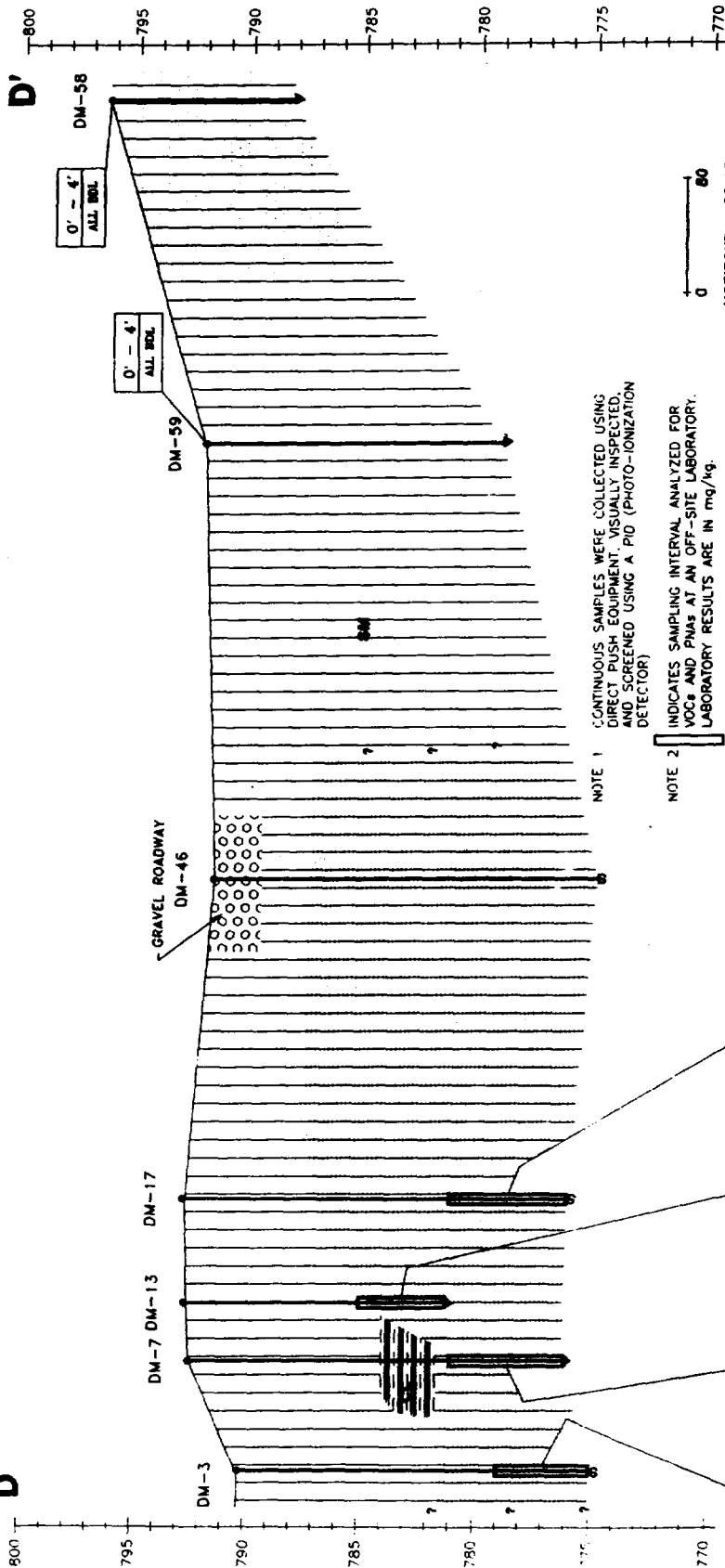






WEST  
D

EAST  
D'



NOTE 1 CONTINUOUS SAMPLES WERE COLLECTED USING DIRECT PUSH EQUIPMENT, VISUALLY INSPECTED, AND SCREENED USING A PID (PHOTO-IONIZATION DETECTOR)

NOTE 2 INDICATES SAMPLING INTERVAL ANALYZED FOR VOCs AND PHAS AT AN OFF-SITE LABORATORY. LABORATORY RESULTS ARE IN mg/kg.

NOTE 3 SOIL CAP MATERIALS OBTAINED FROM AN OFF-SITE SOURCE.

NOTE 4 THE DISCUSSION IN THE TEXT IS NECESSARY FOR A PROPER UNDERSTANDING OF THE SUBSURFACE CONDITIONS.

HORIZONTAL SCALE  
1" = 80 feet  
VERTICAL SCALE IS EXAGGERATED

# FIGURE 8 GENERALIZED SUBSURFACE SECTION D-D'

ON-SITE SOURCE CHARACTERIZATION AND OFF-SITE  
GROUNDWATER INVESTIGATION REPORT  
CANTON, INDIANA

DATE: Dec 12, 1996  
JOB NO.: 13704-031-045  
DRAWN BY: DWG BY  
CHECKED BY: WJB  
APPROVED BY: J1  
DEC 20, 1996

DAMES & MOORE  
771 DOWNEY ROAD, SUITE 200  
ST. LOUIS, MISSOURI 63101  
PHONE: 314-433-1000  
FAX: 314-433-1000

## LEGEND

SILTY SAND

SILTY CLAY

VISIBLY IMPACTED SOIL

END OF PROBE-REFUSAL

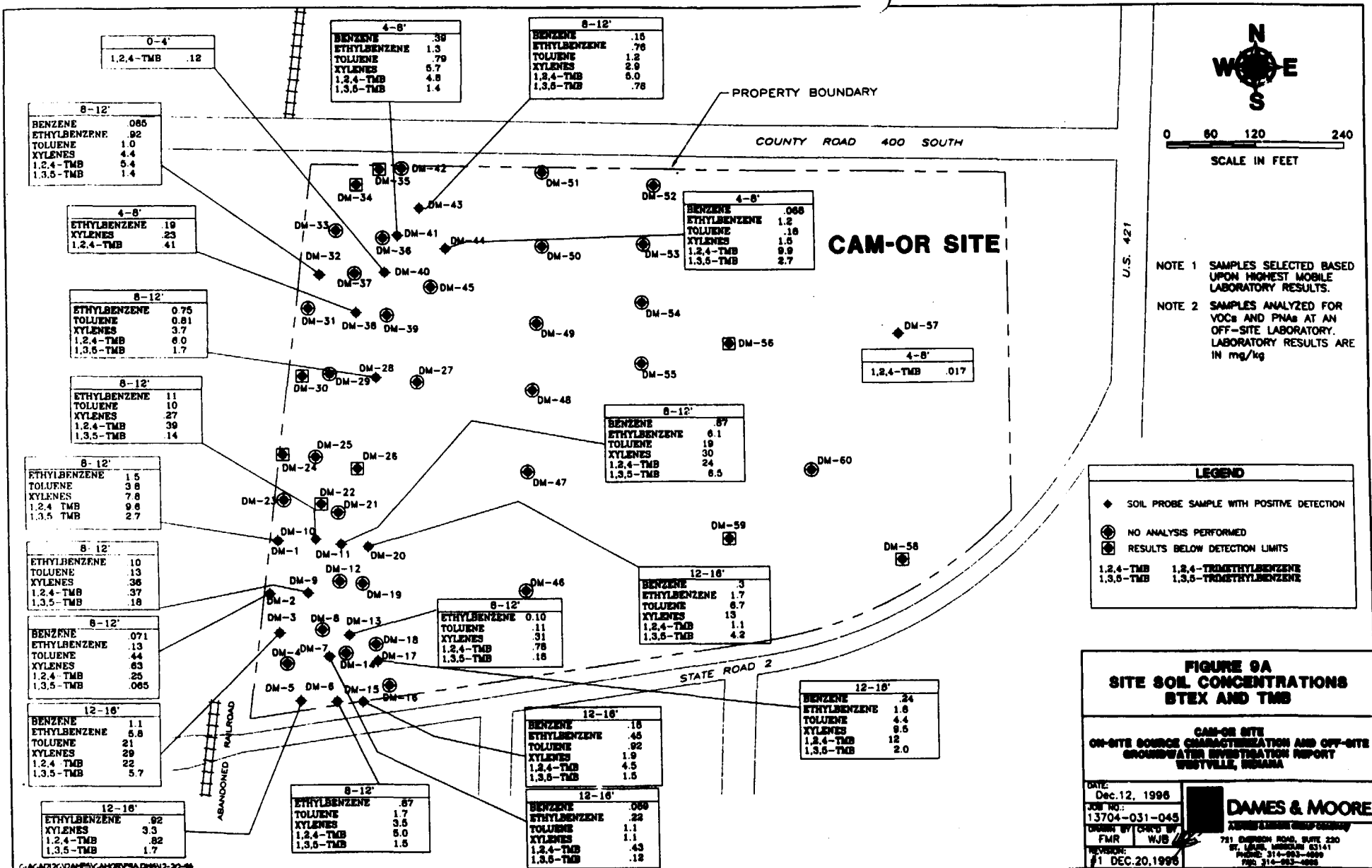
END OF PROBE-GROUNDWATER OBSERVED

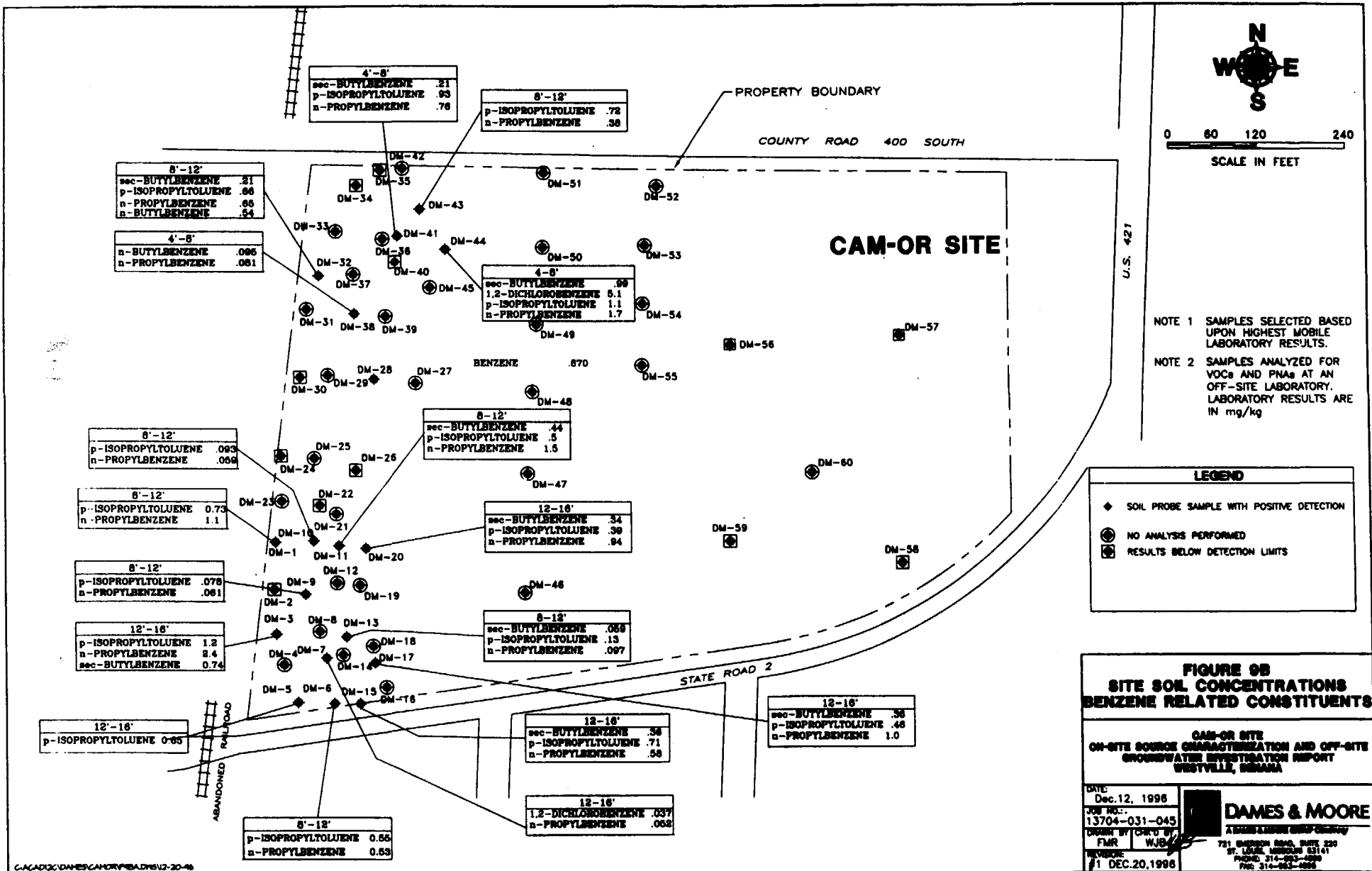
END OF PROBE-16 FOOT DEPTH

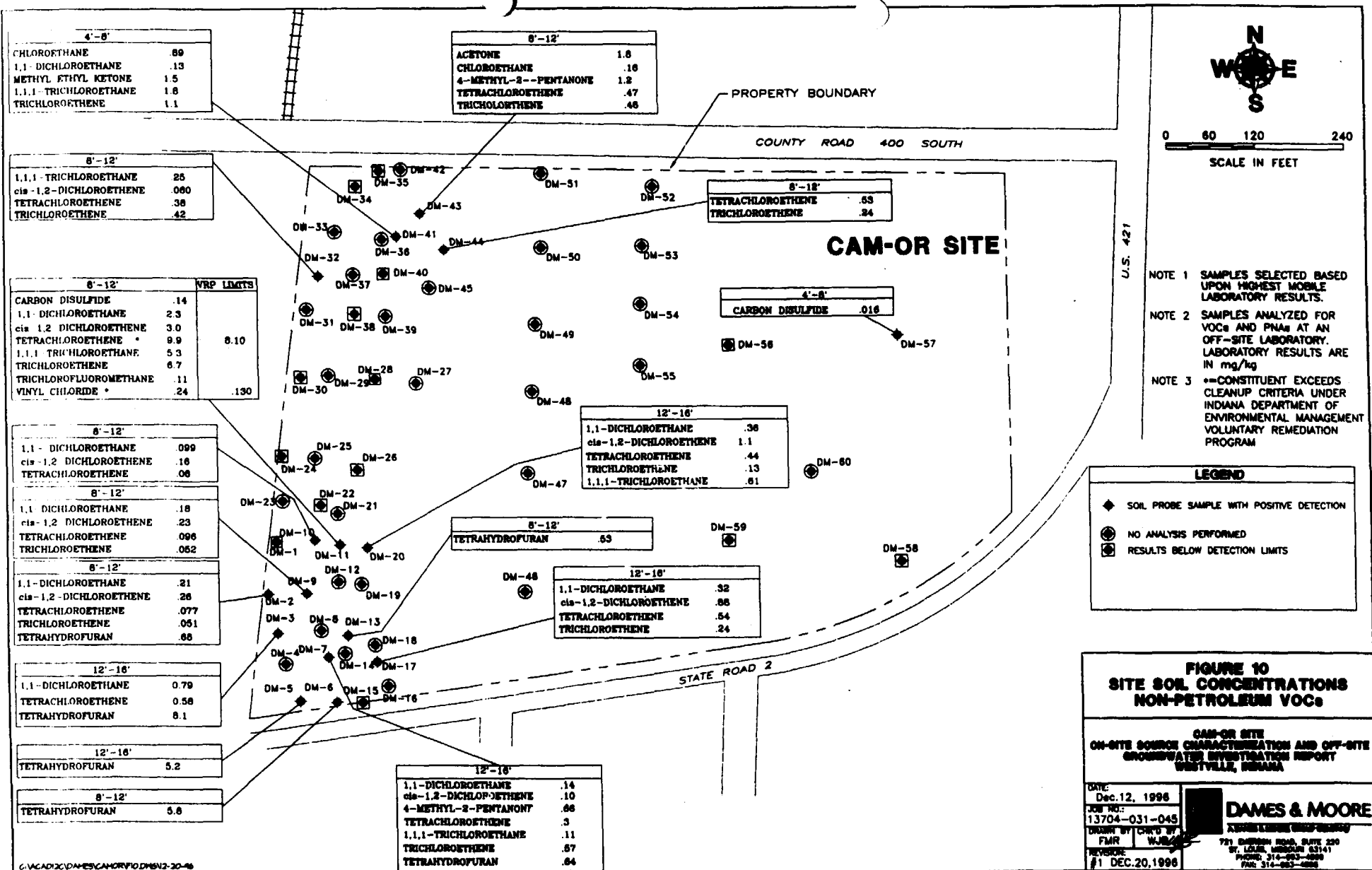
8' - 12'	
sec-BUTYL BENZENE	0.056
p-ISOPROPYL TOLUENE	0.097
p-PROPYLBENZENE	0.037
TETRAHYDROFURAN	0.10
ETHYLENE	0.11
TOLUENE	0.10
1,2-DICHLOROETHANE	0.08
1,3-DICHLOROETHANE	0.10
1,4-DICHLOROETHANE	0.10
1,5-DICHLOROETHANE	0.10
1,6-DICHLOROETHANE	0.10
1,7-DICHLOROETHANE	0.10
1,8-DICHLOROETHANE	0.10
1,9-DICHLOROETHANE	0.10
1,10-DICHLOROETHANE	0.10
1,11-DICHLOROETHANE	0.10
1,12-DICHLOROETHANE	0.10
1,13-DICHLOROETHANE	0.10
1,14-DICHLOROETHANE	0.10
1,15-DICHLOROETHANE	0.10
1,16-DICHLOROETHANE	0.10
1,17-DICHLOROETHANE	0.10
1,18-DICHLOROETHANE	0.10
1,19-DICHLOROETHANE	0.10
1,20-DICHLOROETHANE	0.10
1,21-DICHLOROETHANE	0.10
1,22-DICHLOROETHANE	0.10
1,23-DICHLOROETHANE	0.10
1,24-DICHLOROETHANE	0.10
1,25-DICHLOROETHANE	0.10
1,26-DICHLOROETHANE	0.10
1,27-DICHLOROETHANE	0.10
1,28-DICHLOROETHANE	0.10
1,29-DICHLOROETHANE	0.10
1,30-DICHLOROETHANE	0.10
1,31-DICHLOROETHANE	0.10
1,32-DICHLOROETHANE	0.10
1,33-DICHLOROETHANE	0.10
1,34-DICHLOROETHANE	0.10
1,35-DICHLOROETHANE	0.10
1,36-DICHLOROETHANE	0.10
1,37-DICHLOROETHANE	0.10
1,38-DICHLOROETHANE	0.10
1,39-DICHLOROETHANE	0.10
1,40-DICHLOROETHANE	0.10
1,41-DICHLOROETHANE	0.10
1,42-DICHLOROETHANE	0.10
1,43-DICHLOROETHANE	0.10
1,44-DICHLOROETHANE	0.10
1,45-DICHLOROETHANE	0.10
1,46-DICHLOROETHANE	0.10
1,47-DICHLOROETHANE	0.10
1,48-DICHLOROETHANE	0.10
1,49-DICHLOROETHANE	0.10
1,50-DICHLOROETHANE	0.10
1,51-DICHLOROETHANE	0.10
1,52-DICHLOROETHANE	0.10
1,53-DICHLOROETHANE	0.10
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1,99-DICHLOROETHANE	0.10
1,100-DICHLOROETHANE	0.10

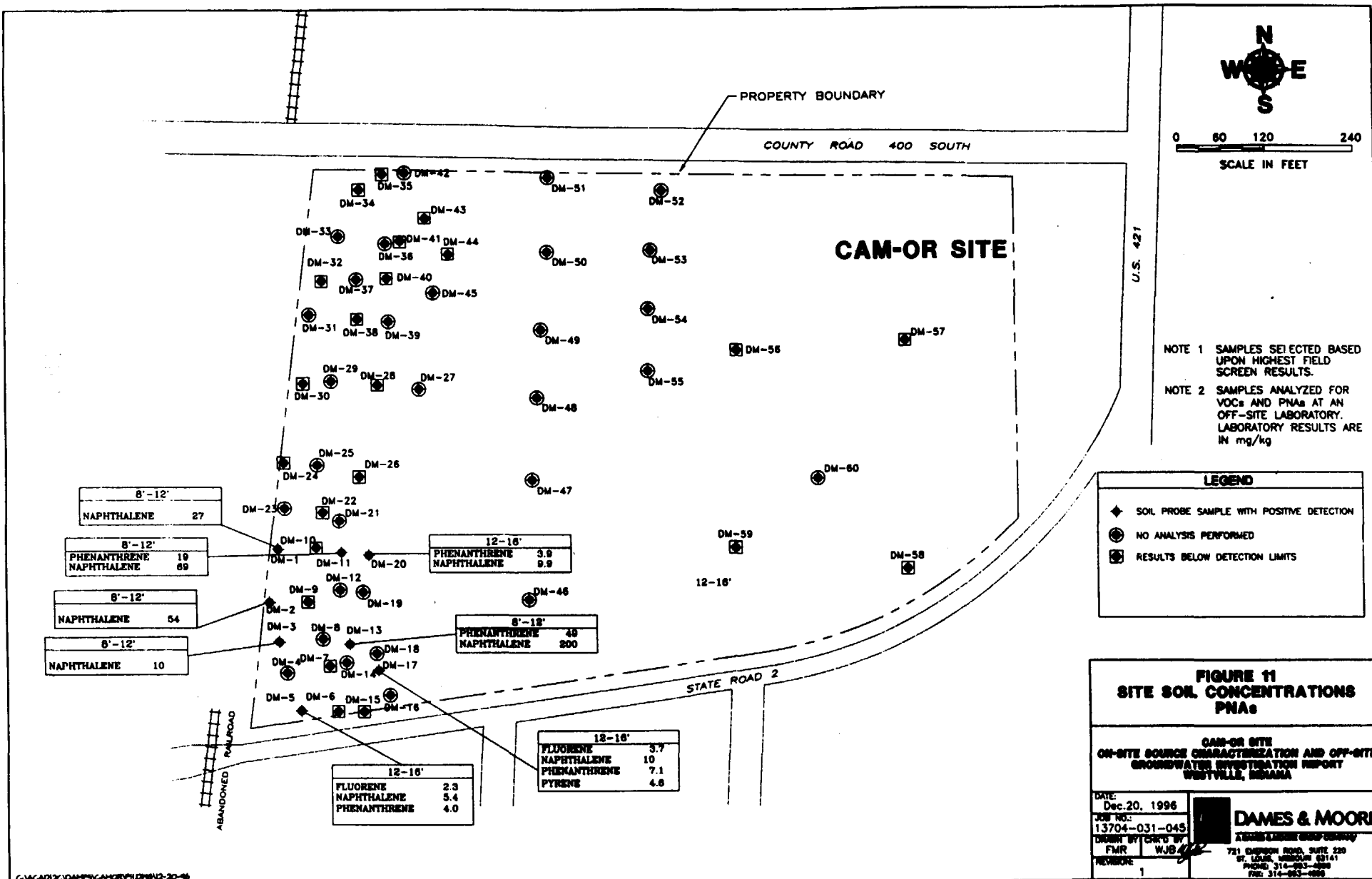
12' - 16'	
sec-BUTYL BENZENE	0.037
p-ISOPROPYL TOLUENE	0.14
p-PROPYLBENZENE	0.10
TETRAHYDROFURAN	0.08
ETHYLENE	0.08
TOLUENE	0.08
1,2-DICHLOROETHANE	0.08
1,3-DICHLOROETHANE	0.08
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1,99-DICHLOROETHANE	0.08
1,100-DICHLOROETHANE	0.08

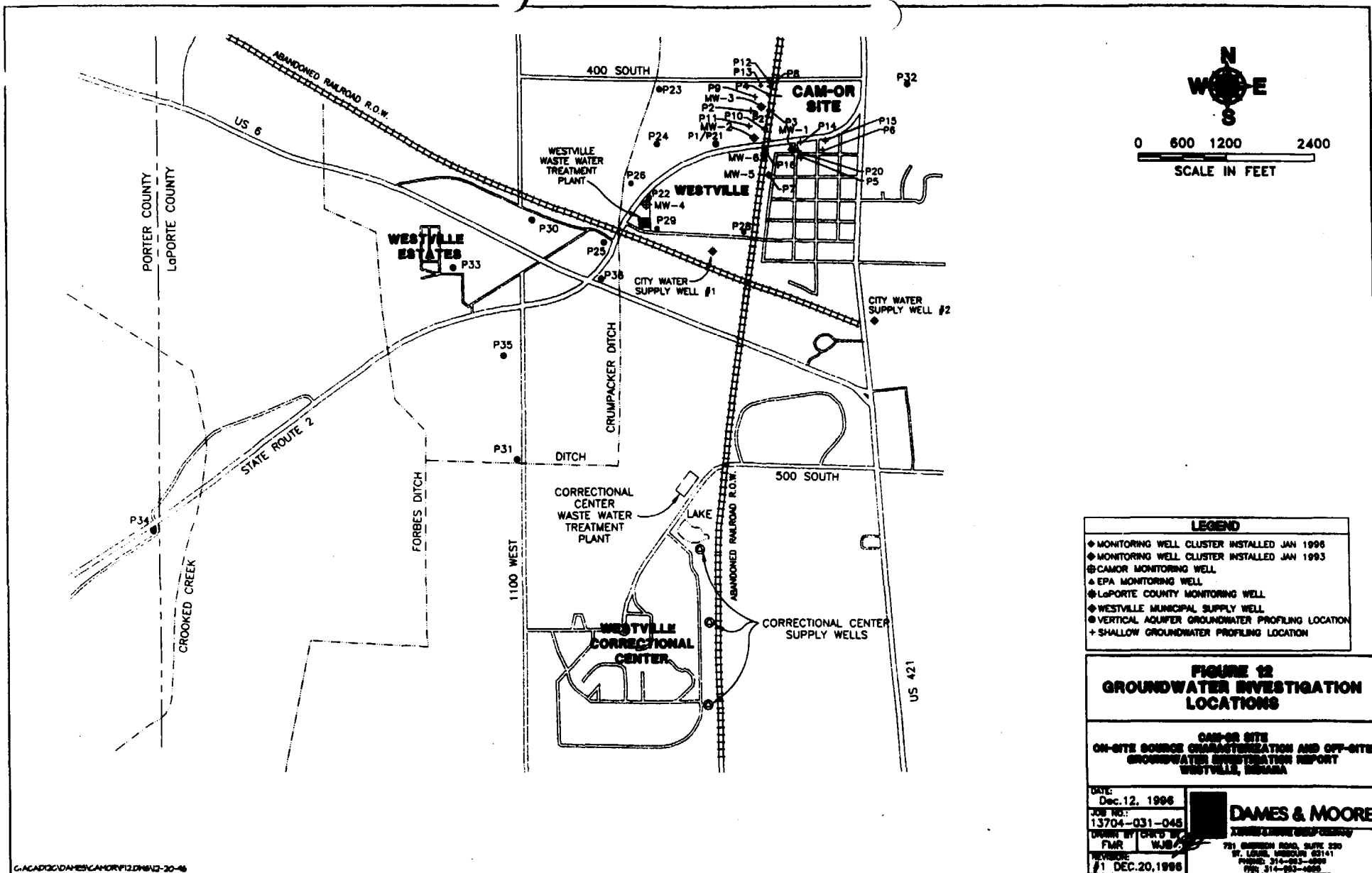
12' - 16'	
sec-BUTYL BENZENE	0.74
p-ISOPROPYL TOLUENE	0.74
p-PROPYLBENZENE	0.74
TETRAHYDROFURAN	0.74
ETHYLENE	0.74
TOLUENE	0.74
1,2-DICHLOROETHANE	0.74
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1,98-DICHLOROETHANE	0.74
1,99-DICHLOROETHANE	0.74
1,100-DICHLOROETHANE	0.74

















0 200 400 800

SCALE IN FEET

NOTE 1. GROUNDWATER ELEVATION DATA MEASURED ON AUG. 20 & 21, 1995, REFERENCED TO USGS DATUM.

NOTE 2. GROUNDWATER FLOW DIRECTIONS AND POTENTIOMETRIC LINES ARE APPROXIMATE; VERTICAL GRADIENT CONSIDERED INSIGNIFICANT FOR HORIZONTAL FLOW DIRECTION.

NOTE 3. WATER LEVEL MEASUREMENT FROM MW-5XD NOT AVAILABLE DUE TO GROUND SUBSIDENCE. PROTECTIVE CASING COULD NOT BE OPENED.

COUNTY ROAD 400 SOUTH

COUNTY ROAD 1100 WEST

ABANDONED RAILROAD R.O.W.

EP1  
776.44

EP2  
775.94

EP3  
(DAMAGED)

CAM-OR SITE

B2  
776.71

B1  
777.31

MW-30  
776.04

MW-35  
775.93

MW-20  
775.78

MW-25  
775.82

MW-15  
775.92

MW-80  
775.92

MW-65  
774.98

(FREE PRODUCT 1.15 R.)

MW-10  
776.38

MW-55  
776.01

MW-5XD  
NA

MW-50  
775.94

MW-45  
772.53

MW-40  
772.53

MW-4XD  
772.45

MW-3  
773.39

WESTVILLE WELL No. 1

ABANDONED RAILROAD R.O.W.

ABANDONED RAILROAD R.O.W.

ABANDONED RAILROAD R.O.W.

ABANDONED RAILROAD R.O.W.

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ABANDONED RAILROAD R.O.W.

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ABANDONED RAILROAD R.O.W.

ABANDONED RAILROAD R.O.W.

ABANDONED RAILROAD R.O.W.

COUNTY ROAD

LP-1  
779.15

U.S. 421

PROPERTY BOUNDARY

FLOW DIRECTION

779

778

LEGEND

- ◆ MONITORING WELL CLUSTER INSTALLED JAN 1996
- ◆ MONITORING WELL CLUSTER INSTALLED JAN 1993
- CAMOR MONITORING WELL
- △ EPA MONITORING WELL
- ◆ LOPORTE COUNTY MONITORING WELL
- ◆ WESTVILLE MUNICIPAL SUPPLY WELL

### FIGURE 15 GROUNDWATER ELEVATION MAP AUGUST 1996

CAM-OR SITE  
ON-SITE SOURCE CHARACTERIZATION AND OFF-SITE  
GROUNDWATER INVESTIGATION REPORT  
WESTVILLE, ARIZONA

DATE:

Dec. 12, 1996

DATE:

13704-031-049

DATE:

BY CHD

FMR

WLS

REVISION:

#1 DEC. 20, 1996

DAMES & MOORE

ENGINEERING

701 GIBSON ROAD, SUITE 200

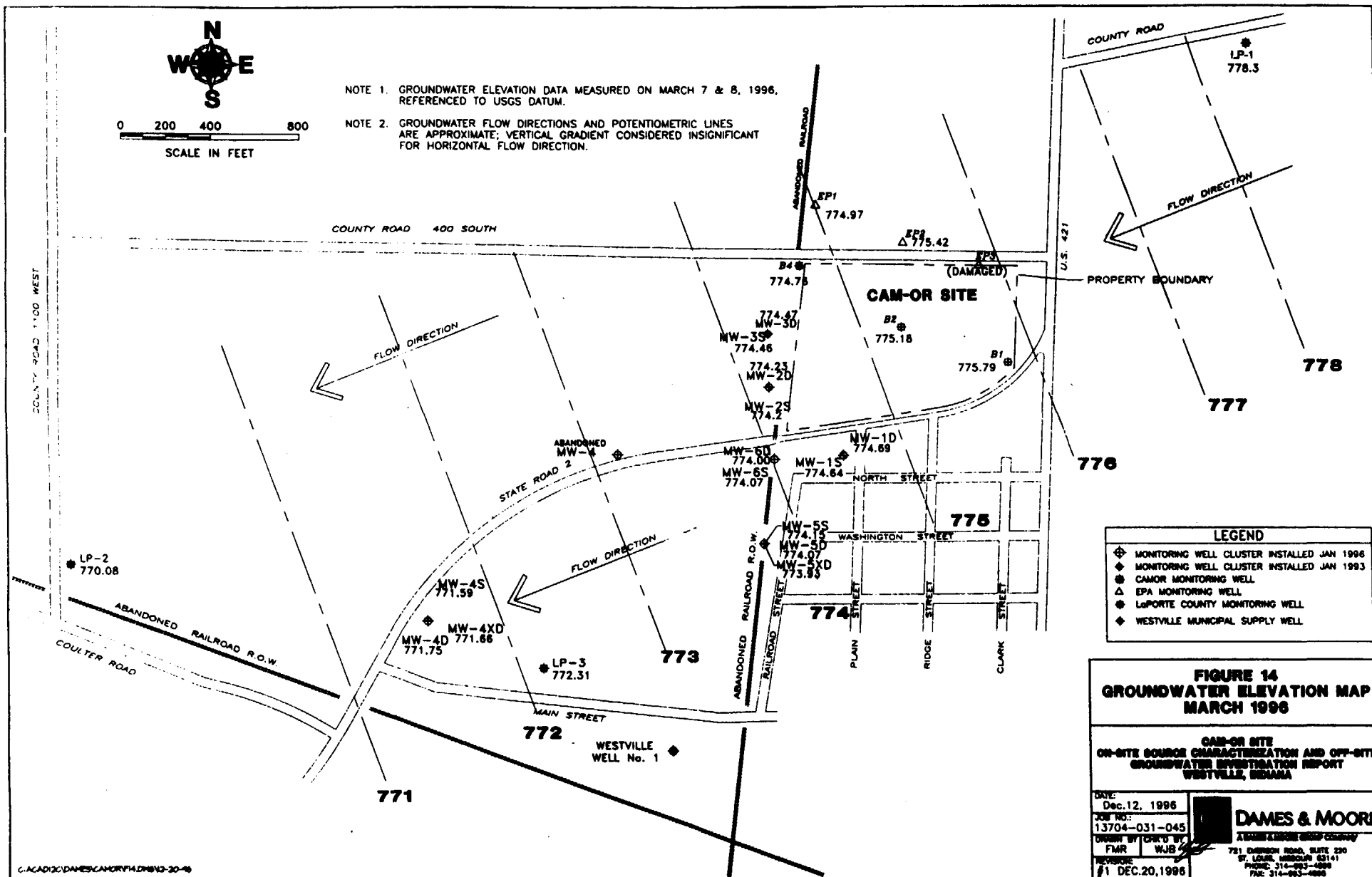
ST. LOUIS, MISSOURI 63141

PHONE: 314-593-2000

FAX: 314-593-4000

C:\ACAD\2\0\DAVES\CAMOR\PS.DWG 12-20-96

316



COUNTY ROAD 400 SOUTH



0 120 240 480  
SCALE IN FEET

#### LEGEND

- ◆ MONITORING WELL CLUSTER INSTALLED JAN 1996
- ◆ MONITORING WELL CLUSTER INSTALLED JAN 1993
- ◆ WESTVILLE MUNICIPAL SUPPLY WELL

NOTE 1 GROUNDWATER SAMPLES WERE ANALYZED FOR VOCs AND SVOCs. LABORATORY RESULTS ARE IN ug/L

NOTE 2 MONITORING WELLS MW-4S AND MW-5D WERE SAMPLED DURING JANUARY 1996.

PROPERTY BOUNDARY

MW-3D  
1,4-DIOXANE 1200

MW-3S  
1,4-DIOXANE 1100  
TCE 5  
cis-1,2-DICHLOROETHYLENE 30  
1,1-DICHLOROETHANE 10

MW-2D  
1,4-DIOXANE 1000  
TCE 5  
ACETONE 60

MW-2S  
1,4-DIOXANE 1200  
TCE 50  
BENZENE 25  
2,4-DIMETHYLPHENOL 210  
CHLOROETHANE 120  
METHYLENE CHLORIDE 5

MW-6D  
BIS (2-EN) PHTHALATE 30  
TCE 5

MW-6S  
METHYLENE CHLORIDE 5

MW-5S ND

MW-5D  
BIS (2-EN) PHTHALATE 64

CAM-OR SITE

MW-1D  
2-BUTANONE  
METHYLENE CHLORIDE 5

MW-1S  
TRICHLOROETHYLENE 35  
cis-1,2-DICHLOROETHYLENE 170  
1,1-DICHLOROETHANE 130  
1,1,1-TRICHLOROETHANE 280  
BIS (2-EN) PHTHALATE 61  
BENZENE 16

NORTH STREET

WASHINGTON STREET

PLAIN STREET

RIDGE STREET

CLARK STREET

STATE ROAD 2

ABANDONED RAILROAD R.O.W.

RAILROAD STREET

MAIN STREET

WESTVILLE WELL No. 1

MW-4D	JAN. '96	MARCH '96	JULY '96
1,4-DIOXANE	91	120	230
BIS (2-EN) PHTHALATE	ND	41	ND

MW-4XD	JAN. '96	MARCH '96	JULY '96
1,4-DIOXANE	480	280	560
BIS (2-EN) PHTHALATE	ND	430	ND

**FIGURE 16  
MARCH 1996 MONITORING WELL  
ANALYTICAL RESULTS**

CAM-OR SITE  
ON-SITE SOURCE CHARACTERIZATION AND OFF-SITE  
GROUNDWATER INVESTIGATION REPORT  
WESTVILLE, INDIANA

DATE:  
Dec. 12, 1996  
JOB NO.:  
13704-031-045  
DRAWN BY: CMO BY  
FMR WJB  
REVISION:  
#1 DEC. 20, 1996

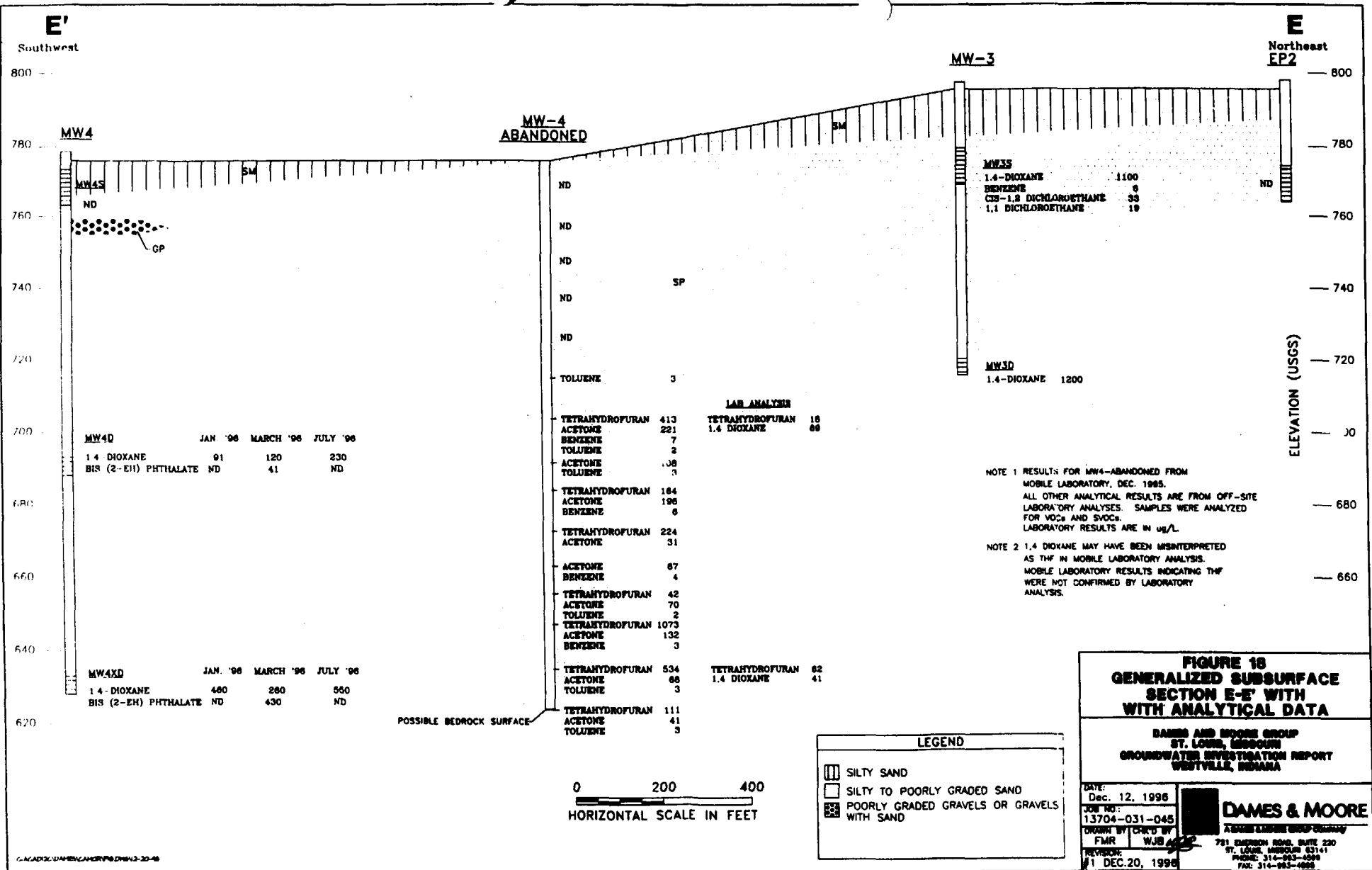
**DAMES & MOORE**

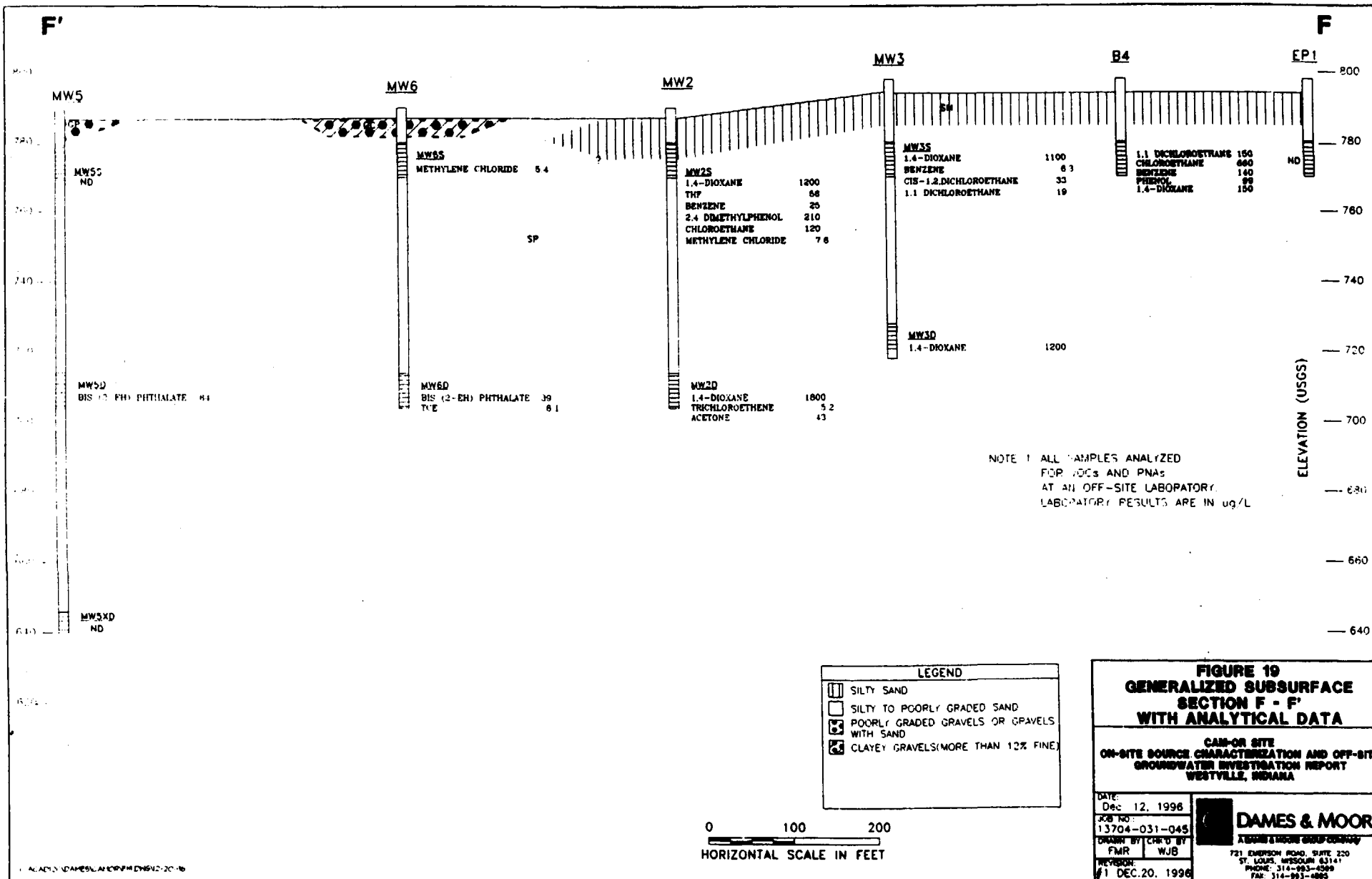
721 BARRON ROAD, SUITE 200  
ST. LOUIS, MISSOURI 63161  
PHONE: 314-465-4000  
FAX: 314-465-4000

ABANDONED RAILROAD R.O.W.  
COULTER ROAD

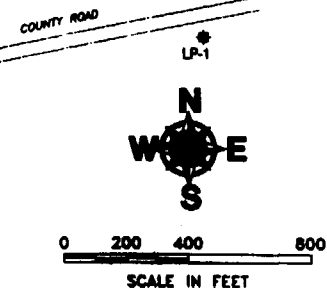
C:\CAD\DC\DWG\CAV\FIG 16.DWG 12-20-96







- NOTE 1 ALL RESULTS FROM MOBILE LABORATORY UNLESS OTHERWISE NOTED. TARGET LIST IN TEXT. LABORATORY RESULTS ARE IN ug/L.
- NOTE 2 ND EQUALS BELOW METHOD DETECTION LIMIT AS DEFINED IN SOURCE INVESTIGATION REPORT.
- NOTE 3 1,4-DIOXANE MAY HAVE BEEN MISINTERPRETED AS THF IN MOBILE LABORATORY ANALYSIS. MOBILE LABORATORY RESULTS INDICATING THF WERE NOT CONFIRMED BY LABORATORY ANALYSIS.



COUNTY ROAD 400 SOUTH

**P1/P21**  
**ABANDONED MW-4**  
**MOBILE LAB**

20-50'	BMD	3
60'	Tol	413
70'	THF	221
	Acet	7
	Ben	2
80'	Tol	108
90'	THF	3
	Acet	184
	Ben	196
100'	THF	6
	Acet	224
110'	Acet	31
	Ben	67
120'	THF	4
	Acet	42
130'	Tol	70
	THF	2
	Acet	1073
140'	THF	132
	Acet	3
	Ben	534
	Acet	68
	Tol	3
150'	THF	111
	Acet	41
	Tol	3

**LAB ANALYSIS**

70'	THF	18
	1,4	69
140'	THF	62
	1,4	41

P10 20':	Tol	3
	EB	18
	Xyl	5
	Acet	60
	THF	2294
45':	Tol	4
	Xyl	9
	Acet	316
	THF	1598

P13 24': Acet 28

P9 20': Acet 71

40': Tol 7

Acet 92

THF 310

P2 ND

<b>P11</b>	20'	DCA	2
	40'	Ben	1
		Tol	9
		Xyl	4
		Acet	46
		THF	16

**P16**  
**MOBILE LAB**

20'	BMD	121
30'	THF	486
40'	THF	1628
50'	THF	1628
	Acet	16
60'	THF	506
	Acet	15
70'	THF	423
80'	THF	27
	Acet	24

**LAB ANALYSIS**

50'	1,4	6.51
140'	Acet	27

P8 30'	TCA	11
	DCA	15
	Acet	229
	THF	65
45'	Tol	3
	Acet	133
	THF	57

P4	28'	DCA	14
	28'RE	DCA	8
		Acet	171
		THF	98

P3 ND

**P14 23'**

Xyl	3
Acet	30

**P15 23'**

Acet	29
------	----

**P6 ND**

**P5 ND**

**P20 23'**

Xyl	5
THF	44

**P7**  
**MOBILE LAB**  
20' - 150': BELOW METHOD DETECTION  
**LAB ANALYSIS**  
130': BELOW METHOD DETECTION

**P22**  
**MOBILE LAB**  
20-150': BELOW METHOD DETECTION  
**LAB ANALYSIS**  
150': 1,4=360 Acet=26

**LEGEND**

- ◆ MONITORING WELL CLUSTER INSTALLED JAN 1996
- ◆ MONITORING WELL CLUSTER INSTALLED JAN 1993
- ⊗ CAMOR MONITORING WELL
- △ EPA MONITORING WELL
- ◆ LaPORTE COUNTY MONITORING WELL
- ◆ WESTVILLE MUNICIPAL SUPPLY WELL
- ◆ SOIL SAMPLING LOCATION
- ◆ DEEP GROUNDWATER PROFILING PROBE
- + SHALLOW GROUNDWATER PROFILING PROBE

THF TETRAHYDROFURAN (SEE NOTE)

1,4 1,4 DIOXANE

B BENZENE

Cla Cla- 1,2 -DICHLOROETHANE

Acet ACETONE

Tol TOLUENE

X XYLENE

DCE 1,1 -DICHLOROETHENE

TCA 1,1,1 -TRICHLOROETHANE

Chloro CHLOROETHANE

DCA 1,1 -DICHLOROETHANE

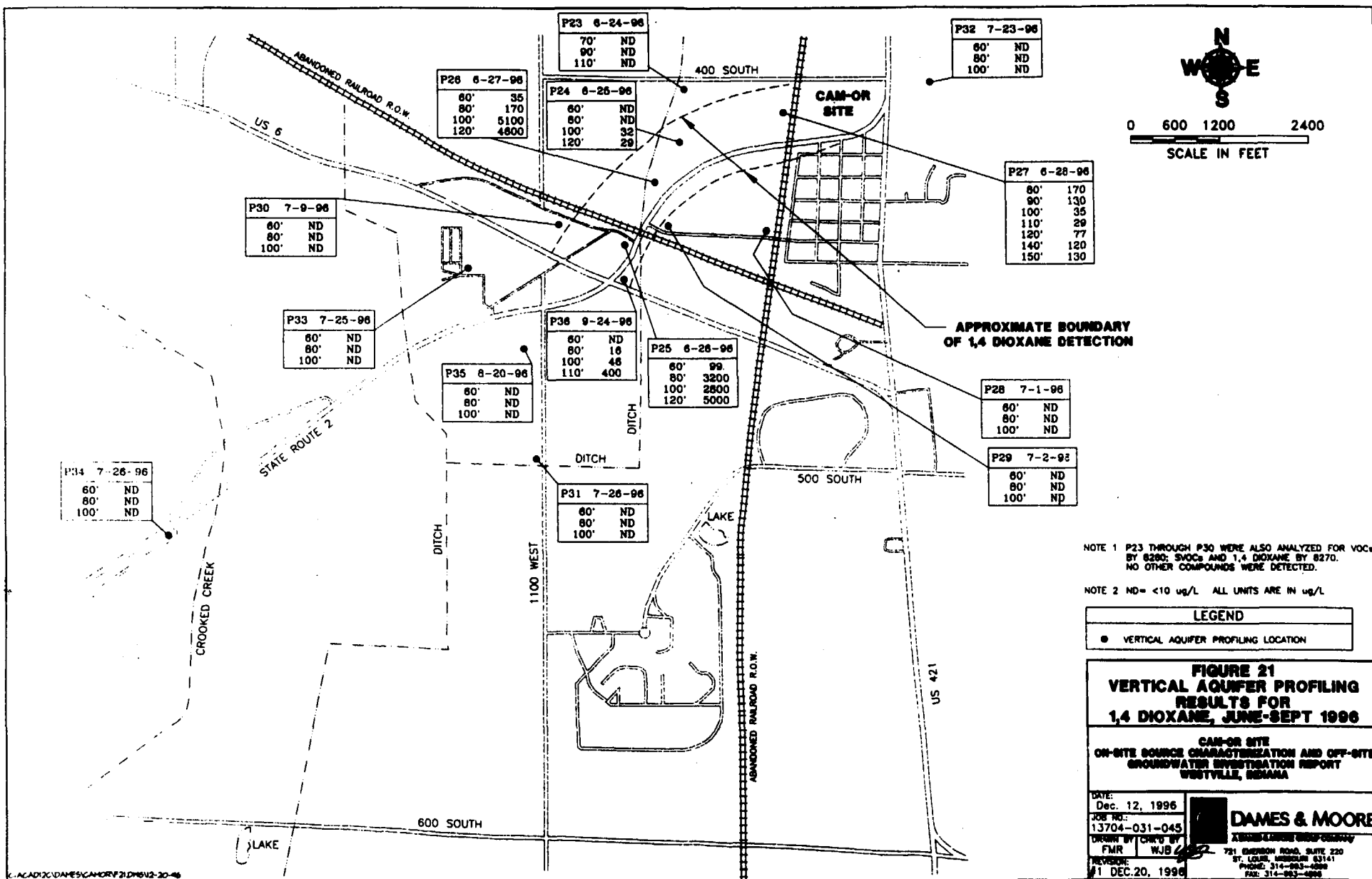
EB ETHYLBENZENE

**FIGURE 20**  
**DIRECT PUSH**  
**GROUNDWATER PROFILING**  
**DECEMBER 1996 - JANUARY 1996**

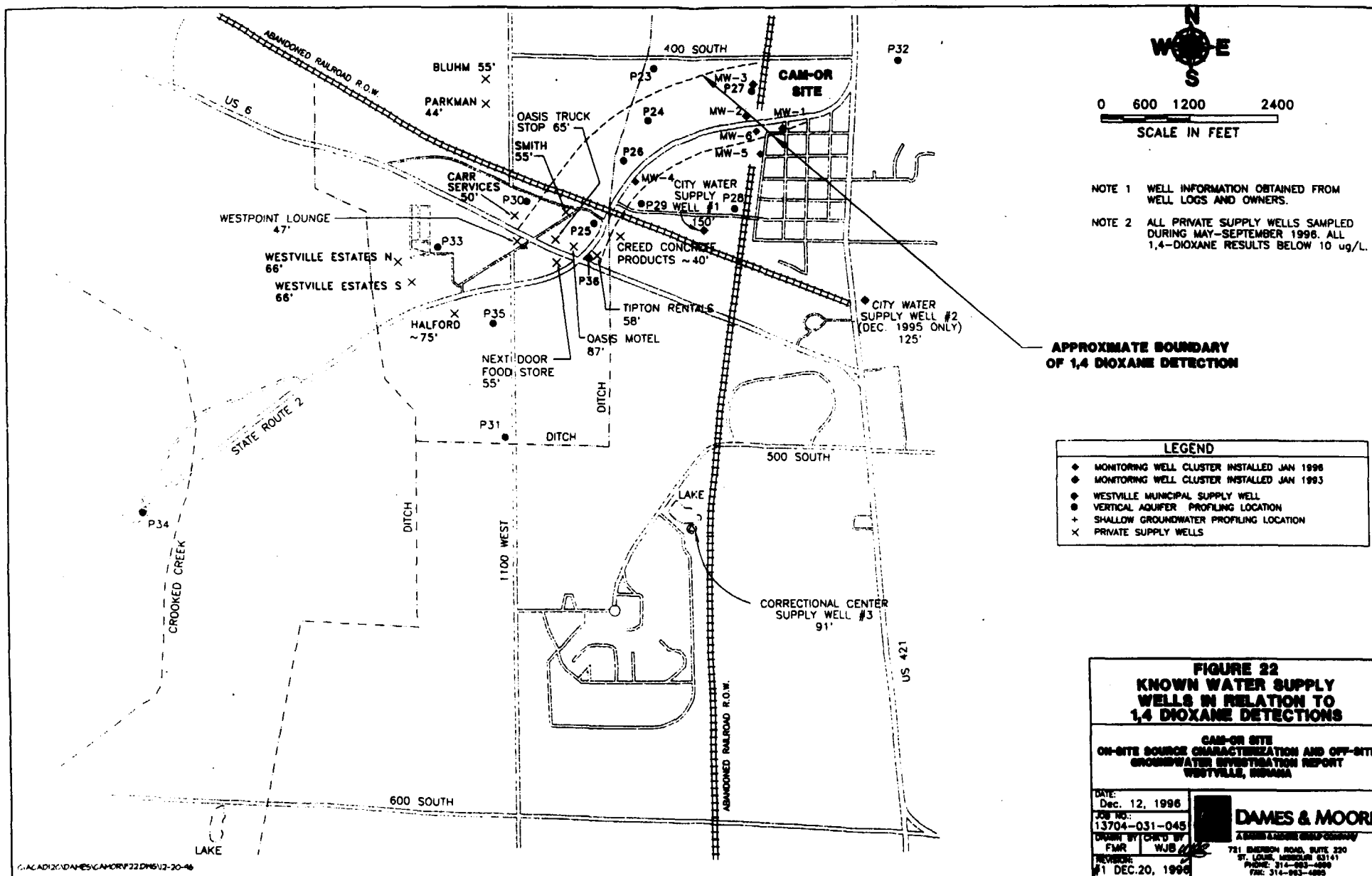
**CAM-OR SITE**  
**ON-SITE SOURCE CHARACTERIZATION AND OFF-SITE**  
**GROUNDWATER INVESTIGATION REPORT**  
**WESTVILLE, INDIANA**

DATE: Dec. 12, 1996  
JOB NO.: 13704-031-045  
DRAWN BY: C.R.G. BY FMR WJB  
REVIEWED BY: J1 DEC.20, 1996

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**TABLE 1**  
**SOIL SAMPLING RESULTS**  
**CAM-OR SITE - WESTVILLE, INDIANA**

SAMPLE NO.	DM1	DM2	DM3	DM5	DM6	DM7	DM9	DM10	DM11	DM13	DM15	DM17	DM20	DM22	IDEM Criteria mg/kg
DEPTH	8-12	8-12	12-16	12-16	8-12	12-16	8-12	8-12	8-12	8-12	12-16	12-16	12-16	12-16	
VOCs															
Acetone	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	136.29
Carbon Disulfide	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.14	BDL	BDL	BDL	BDL	BDL	NA
Chloroethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1,000
1,1-Dichloroethane	BDL	0.21	0.79	BDL	BDL	0.14	0.18	0.099	2.3	BDL	BDL	0.32	0.36	BDL	1,000
cis-1,2-Dichloroethene	BDL	0.26	BDL	BDL	BDL	0.10	0.23	0.16	3.0	BDL	BDL	0.88	1.1	BDL	102.48
Methyl Ethyl Ketone	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	146.24
4-Methyl 2-Pentanone	BDL	BDL	BDL	BDL	BDL	0.66	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	407.48
Tetrachloroethene	BDL	0.077	0.58	BDL	BDL	0.3	0.096	0.06	9.9	BDL	BDL	0.54	0.44	BDL	8.01
Tetrahydrofuran	BDL	0.68	8.1	5.2	5.8	0.64	BDL	BDL	BDL	.53	BDL	BDL	BDL	BDL	NA
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	0.11	BDL	BDL	5.3	BDL	BDL	BDL	0.61	BDL	1,000
Trichloroethene	BDL	0.051	BDL	BDL	BDL	0.57	0.052	BDL	6.7	BDL	BDL	0.24	0.13	BDL	25.73
Trichlorofluoromethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.11	BDL	BDL	BDL	BDL	BDL	NA
Vinyl Chloride	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.24	BDL	BDL	BDL	BDL	BDL	0.13

Notes: All results are reported in mg/kg (milligrams per kilogram or parts per million)  
Only constituents with one or more detections are shown in this table.  
BDL Below Detection Limit

Samples were analyzed for full SW-846 Method 8260 (VOC) and 8270 (PNA) lists  
Depths are sample collection intervals reported in feet below ground surface.

**TABLE 1**  
**SOIL SAMPLING RESULTS**  
**CAM-OR SITE - WESTVILLE, INDIANA**

SAMPLE NO.	DM24	DM26	DM28	DM30	DM32	DM34	DM35	DM38	DM40	DM41	DM43	DM44	DM56	DM57	DM58	DM59	IDEM Criteria mg/kg
DEPTH	8-12	8-12	8-12	12-16	8-12	8-12	4-8	4-8	0-4	4-8	8-12	4-8	8-12	4-8	0-4	0-4	
VOCs																	
Acetone	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.8	BDL	BDL	BDL	BDL	BDL	136.29
Carbon Disulfide	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	.016	BDL	BDL	NA
Chloroethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.89	0.16	BDL	BDL	BDL	BDL	BDL	1,000
1,1-Dichloroethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.13	BDL	BDL	BDL	BDL	BDL	BDL	1,000
cis-1,2-Dichloroethene	BDL	BDL	BDL	BDL	0.060	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	102.48
Methyl Ethyl Ketone	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5	BDL	BDL	BDL	BDL	BDL	BDL	146.24
4-Methyl 2-Pentanone	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.2	BDL	BDL	BDL	BDL	BDL	407.48
Tetrachloroethane	BDL	BDL	BDL	BDL	0.38	BDL	BDL	BDL	BDL	BDL	0.47	0.53	BDL	BDL	BDL	BDL	8.01
Tetrahydrofuran	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	0.25	BDL	BDL	BDL	BDL	1.8	BDL	BDL	BDL	BDL	BDL	BDL	1,000
Trichloroethene	BDL	BDL	BDL	BDL	0.42	BDL	BDL	BDL	BDL	1.1	0.46	0.24	BDL	BDL	BDL	BDL	25.73
Trichlorofluoromethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA
Vinyl Chloride	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.13

Notes: All results are reported in mg/kg (milligrams per kilogram or parts per million)  
Only constituents with one or more detections are shown in this table.  
BDL Below Detection Limit

Samples were analyzed for full SW-846 Method 8260 (VOC) and 8270 (PNA) lists  
Depths are sample collection intervals reported in feet below ground surface.

**TABLE 1**  
**SOIL SAMPLING RESULTS**  
**CAM-OR SITE - WESTVILLE, INDIANA**

SAMPLE NO.	DM1	DM2	DM3	DM5	DM6	DM7	DM9	DM10	DM11	DM13	DM15	DM17	DM20	DM22	DM24	DM26	IDEM Criteria mg/kg
DEPTH	8-12	8-12	12-16	12-16	8-12	12-16	8-12	8-12	8-12	8-12	12-16	12-16	12-16	12-16	8-12	8-12	
BENZENE RELATED VOCs																	
Benzene	BDL	0.071	1.1	BDL	BDL	0.089	BDL	BDL	0.87	BDL	0.18	0.24	0.3	BDL	BDL	BDL	4.77
Ethylbenzene	1.5	0.13	5.8	0.92	0.87	0.22	0.10	0.11	6.1	0.10	0.45	1.8	1.7	BDL	BDL	BDL	1,000
Toluene	3.8	0.44	21	BDL	1.7	1.1	0.13	0.10	19.0	0.11	0.92	4.4	6.7	BDL	BDL	BDL	1,000
1,2,4-Trimethylbenzene	9.6	0.25	22	0.82	5.0	0.43	0.37	0.39	24.0	0.78	4.5	12	1.1	BDL	BDL	BDL	NA
1,3,5-Trimethylbenzene	2.7	0.065	5.7	1.7	1.5	0.12	0.18	0.14	6.5	0.18	1.5	2.0	4.2	BDL	BDL	BDL	NA
Xylenes (total)	7.8	0.63	29	3.3	3.5	1.1	0.36	0.27	30	0.31	1.9	9.5	13	BDL	BDL	BDL	1,000
n-Butylbenzene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA
sec-Butylbenzene	BDL	BDL	0.74	BDL	BDL	BDL	BDL	BDL	0.44	0.059	0.36	0.36	0.34	BDL	BDL	BDL	NA
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	0.037	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10,000
p-Isopropyltoluene	0.73	BDL	1.2	0.65	0.55	BDL	0.078	0.093	0.5	0.13	0.71	0.46	0.39	BDL	BDL	BDL	NA
n-Propylbenzene	1.1	BDL	2.4	BDL	0.53	0.052	0.061	0.059	1.5	0.097	0.58	1.0	0.94	BDL	BDL	BDL	NA
PNA's																	
Fluorene	BDL	BDL	BDL	2.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3.7	BDL	BDL	BDL	BDL	10,000
Napthalene	27	54	10	5.4	BDL	BDL	BDL	BDL	69	200	BDL	10	9.9	BDL	BDL	BDL	10,000
Phenanthrene	BDL	BDL	BDL	4.0	BDL	BDL	BDL	BDL	19	49	BDL	7.1	3.9	BDL	BDL	BDL	NA
Pyrene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4.6	BDL	BDL	BDL	BDL	10,000
1,4-Dioxane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA

Notes: All results are reported in mg/kg (milligrams per kilogram or parts per million)  
Only constituents with one or more detections are shown in this table.  
BDL Below Detection Limit

Samples were analyzed for full SW-846 Method 8260 (VOC) and 8270 (PNA) lists  
Depths are sample collection intervals reported in feet below ground surface.

**TABLE 1**  
**SOIL SAMPLING RESULTS**  
**CAM-OR SITE - WESTVILLE, INDIANA**

SAMPLE NO.	DM28	DM30	DM32	DM34	DM35	DM38	DM40	DM41	DM43	DM44	DM56	DM57	DM58	DM59	IDEM Criteria mg/kg
DEPTH	8-12	12-16	8-12	8-12	4-8	4-8	0-4	4-8	8-12	4-8	8-12	4-8	0-4	0-4	
<b>BENZENE RELATED VOCs</b>															
Benzene	BDL	BDL	0.085	BDL	BDL	BDL	BDL	0.39	0.15	0.068	BDL	BDL	BDL	BDL	4.77
Ethylbenzene	0.75	BDL	0.92	BDL	BDL	0.19	BDL	1.3	0.76	1.2	BDL	BDL	BDL	BDL	1,000
Toluene	0.81	BDL	1.0	BDL	BDL	BDL	BDL	0.79	1.2	0.18	BDL	BDL	BDL	BDL	1,000
1,2,4-Trimethylbenzene	6.0	BDL	5.4	BDL	BDL	0.41	0.12	4.8	5.0	9.9	BDL	0.017	BDL	BDL	NA
1,3,5-Trimethylbenzene	1.7	BDL	1.4	BDL	BDL	BDL	BDL	1.4	0.78	2.7	BDL	BDL	BDL	BDL	NA
Xylenes (total)	3.7	BDL	4.4	BDL	BDL	0.23	BDL	5.7	2.9	1.5	BDL	BDL	BDL	BDL	1,000
n-Butylbenzene	BDL	BDL	0.54	BDL	BDL	0.095	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA
sec-Butylbenzene	BDL	BDL	0.21	BDL	BDL	BDL	BDL	0.21	BDL	0.99	BDL	BDL	BDL	BDL	NA
1,2-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5.1	BDL	BDL	BDL	BDL	10,000
p-Isopropyltoluene	BDL	BDL	0.66	BDL	BDL	BDL	BDL	0.93	0.72	1.1	BDL	BDL	BDL	BDL	NA
n-Propylbenzene	BDL	BDL	0.65	BDL	BDL	0.081	BDL	0.76	0.38	1.7	BDL	BDL	BDL	BDL	NA
<b>PNAs</b>															
Fluorene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10,000
Napthalene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10,000
Phenanthrene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA
Pyrene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10,000
1,4-Dioxane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA

Notes: All results are reported in mg/kg (milligrams per kilogram or parts per million)  
Only constituents with one or more detections are shown in this table.  
BDL Below Detection Limit

Samples were analyzed for full SW-846 Method 8260 (VOC) and 8270 (PNA) lists  
Depths are sample collection intervals reported in feet below ground surface.

**TABLE 2  
GROUNDWATER ELEVATIONS  
CAM-OR SITE - WESTVILLE, INDIANA**

	Top of Casing Elevation	Date	Depth to Groundwater <sup>4</sup>	Groundwater Elevation	Date	Depth to Groundwater	Groundwater Elevation	Date	Depth to Groundwater	Groundwater Elevation
LP1	817.08	12/6/95	37.8	779.28	3/8/96	38.78	778.30	8/20/96	37.93	779.15
LP2	787.12	12/6/95	16.72	770.40	3/8/96	17.04	770.08	8/20/96	15.47	771.65
LP3	784.36	12/6/95	11.75	772.61	3/8/96	12.05	772.31	8/20/96	10.97	773.39
EP1	801.60	12/6/95	24.4	777.20	3/8/96	25.16	776.44	8/21/96	23.63	777.97
EP2	798.10	12/6/95	21.85	776.25	3/8/96	22.68	775.42	8/21/96	21.16	776.94
B4	798.73	12/6/95	23.23	775.50	3/8/96	23.97	774.76	8/21/96	22.32	776.41
B2	796.18	12/6/95	NA <sup>1</sup>		3/8/96	21.00	775.18	8/21/96	19.47	776.71
B1	808.51	12/6/95	NA <sup>1</sup>		3/8/96	32.72	775.79	8/21/96	31.2	777.31
MW1S	792.30	12/7/95	16.97	775.33	3/7/96	17.66	774.64	8/21/96	16.09	776.21
MW1D	792.52	12/7/95	17.11	775.41	3/7/96	17.83	774.69	8/21/96	16.14	776.38
MW2S	790.77	12/6/95	15.89	774.88	3/7/96	16.57	774.20	8/21/96	14.95	775.82
MW2D	790.79	12/6/95	NA <sup>1</sup>		3/7/96	16.56	774.23	8/21/96	15.01	775.78
MW3S	797.40	12/6/95	22.43	774.97	3/7/96	22.94	774.46	8/21/96	21.45	775.95
MW3D	797.60	12/6/95	22.43	775.17	3/7/96	23.13	774.47	8/21/96	21.56	776.04
MW4S	778.30		NA <sup>2</sup>		3/8/96	6.71	771.59	8/21/96	5.77	772.53
MW4D	778.41		NA <sup>2</sup>		3/8/96	6.66	771.75	8/21/96	5.88	772.53
MW4XD	778.37		NA <sup>2</sup>		3/8/96	6.71	771.66	8/21/96	5.92	772.45
MW5S	789.33		NA <sup>2</sup>		3/8/96	15.18	774.15	8/21/96	13.3	776.03
MW5D	789.27		NA <sup>2</sup>		3/8/96	15.2	774.07	8/21/96	13.73	775.54
MW5XD	789.07		NA <sup>2</sup>		3/8/96	15.14	773.93	8/21/96	NA <sup>3</sup>	
MW6S	791.93		NA <sup>2</sup>		3/8/96	17.86	774.07	8/21/96	16.97	774.96
MW6D	791.99		NA <sup>2</sup>		3/8/96	17.99	774.00	8/21/96	16.47	775.52

Notes: <sup>1</sup> Well inaccessible due to inclement weather conditions (sub-zero temperatures)  
<sup>2</sup> Well not yet installed  
<sup>3</sup> Well inaccessible due to ground subsidence and the protective cover resting atop the well casing  
<sup>4</sup> Measurement from top of casing

**TABLE 3  
GROUNDWATER SAMPLING RESULTS  
CAM-OR SITE - WESTVILLE, INDIANA**

Constituent	IDEM VRP Cleanup Goals <sup>1</sup>	B-1	B-2 Dup	B-2	B-4	EP-2	MWIS					
		Jan '96	Jan '96	Jan '96	Jan '96	Jan '96	Nov '92	June '93	Aug '93	June '94	Jan '96	Mar '96
Semi-Volatiles by 8270												
bis (2-EH) Phthalate	6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	61
Dimethylphthalate	304,000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Methylnaphthene		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dioxane		BDL	170 <sup>2</sup>	180 <sup>2</sup>	150 <sup>2</sup>	BDL	NA	NA	NA	NA	BDL	BDL
2,4 Dimethylphenol		BDL	BDL	BDL	99 <sup>2</sup>	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Volatiles by 8240												
Acetone	3,040	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL	BDL	140 <sup>2</sup>	BDL	13	49/49	25/53	20	BDL	16
Chloroethane	23,160.75	BDL	BDL	BDL	660 <sup>2</sup>	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloromethane		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2 DCE	70	BDL	650 <sup>2</sup>	630 <sup>2</sup>	BDL	BDL	190 <sup>4</sup>	490/480 <sup>4</sup>	170/240 <sup>4</sup>	150	87 <sup>2</sup>	170
Methylene Chloride		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	26 <sup>2</sup>	BDL	BDL
Tetrahydrofuran		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethene	5	BDL	27B <sup>2</sup>	28B <sup>2</sup>	BDL	BDL	6	30/30	16/22	22	360B <sup>2</sup>	33
1,1 Dichloroethane	640	BDL	140 <sup>2</sup>	140 <sup>2</sup>	84 <sup>2</sup>	BDL	27	110/110	36/59	70	52 <sup>2</sup>	BDL
1,1,1 TCA	200	BDL	BDL	BDL	BDL	BDL	110	520/500	140/220 <sup>3</sup>	190	87 <sup>2</sup>	260
1,2 Dichloroethane	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Butanone		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes: All values are in ug/L ( micrograms per liter or parts per billion)  
BDL Below method detection limited using EPA SW-846 Method 8240  
for VOCs and 8270 for SVOCs.  
<sup>1</sup> Residential cleanup scenario.  
<sup>3</sup> Value requalified as estimated.

B Indicates analyte detected in field blank which was collected by passing distilled water through a submersible pump.  
NA Not Analyzed  
<sup>2</sup> Considered to be sampling or laboratory artifacts based on the results resampling duplicate and split samples.  
<sup>4</sup> Total cis and trans 1,2-dichloroethene

**TABLE 3  
GROUNDWATER SAMPLING RESULTS  
CAM-OR SITE - WESTVILLE, INDIANA**

Constituent	IDEM VRP Cleanup Goals¹	MW-1D						MW-2S					
		Nov '92	June'93	Aug '93	June '94	Jan '96	Mar '96	Nov '92	June'93	Aug '93	June '94	Jan '96	Mar'96
Semi-Volatiles by 8270													
bis (2-EH) Phthalate	6	BDL	BDL	BDL	BDL	BDL	BDL	15	BDL	BDL	BDL	BDL	BDL
Dimethylphthalate	304,000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Methylnapthene		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dioxane		NA	NA	NA	NA	BDL	BDL	NA	NA	NA	NA	1,300²	1,200
2,4 Dimethylphenol		BDL	BDL	BDL	BDL	BDL	BDL	92	130	110	17/20	180²	210
2-Picoline		BDL	BDL	BDL	BDL	BDL	BDL	BDL	50	BDL	BDL	BDL	BDL
Volatiles by 8240													
Acetone	3,040	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	47²	BDL	BDL
Benzene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	11/10	23²	25
Chloroethane	23,160.75	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	62/25	BDL	120
Chloromethane		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	98²	BDL
cis-1,2 DCE	70	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride		BDL	BDL	BDL	19	BDL	6	BDL	BDL	BDL	16³/BDL	BDL	8
Tetrahydrofuran		BDL	BDL	BDL	BDL	BDL	BDL	540	2,000	53	350/560	200²	56
Trichloroethene	5	BDL	BDL	BDL	BDL	470B²	BDL	BDL	BDL	BDL	BDL	270B²	BDL
1,1 Dichloroethane	640	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1 TCA	200	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2 Dichloroethane	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Butanone		BDL	BDL	BDL	BDL	BDL	60	BDL	BDL	BDL	BDL	BDL	BDL

Notes: All values are in ug/L ( micrograms per liter or parts per billion)  
 BDL Below method detection limited using EPA SW-846 Method 8240  
 for VOCs and 8270 for SVOCs.  
<sup>1</sup> Residential cleanup scenario.  
<sup>3</sup> Value requalified as estimated.

B Indicates analyte detected in field blank which was collected by passing distilled water through a submersible pump.  
 NA Not Analyzed  
<sup>2</sup> Considered to be sampling or laboratory artifacts based on the results resampling duplicate and split samples.  
<sup>4</sup> Total cis and trans 1,2-dichloroethene



**TABLE 3  
GROUNDWATER SAMPLING RESULTS  
CAM-OR SITE - WESTVILLE, INDIANA**

Constituent	IDEM VRP Cleanup Goals <sup>1</sup>	MW-2D						MW-3S					
		Nov '92	June'93	Aug '93	June '94	Jan '96	Mar '96	Nov '92	June'93	Aug '93	June '94	Jan '96	Mar '96
Semi-Volatiles by 8270													
bis (2-EH) Phthalate	6	19	BDL	BDL	BDL	BDL	BDL	24	BDL	BDL	BDL	BDL	BDL
Dimethylphthalate	304,000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Methylnapthene		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dioxane		NA	NA	NA	NA	7,600 <sup>2</sup>	1,800	NA	NA	NA	NA	1,300 <sup>2</sup>	1,100
2,4 Dimethylphenol		37	BDL	BDL	31	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Volatiles by 8240													
Acetone	3,040	BDL	BDL	BDL	47 <sup>2</sup>	BDL	43	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	6
Chloroethane	23,160.75	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloromethane		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2 DCE	70	BDL	BDL	BDL	BDL	BDL	BDL	64 <sup>4</sup>	64 <sup>4</sup>	41 <sup>4</sup>	14 <sup>4</sup>	BDL	33
Methylene Chloride		BDL	BDL	BDL	16 <sup>2</sup>	BDL	BDL	BDL	BDL	BDL	6 <sup>2</sup>	31 <sup>2</sup>	BDL
Tetrahydrofuran		130	BDL	94	BDL	BDL	BDL	150	88	BDL	BDL	BDL	BDL
Trichloroethene	5	BDL	BDL	BDL	BDL	380B <sup>2</sup>	5	BDL	BDL	BDL	BDL	350B <sup>2</sup>	BDL
1,1 Dichloroethane	640	BDL	BDL	BDL	BDL	BDL	BDL	14	17	12	6	16 <sup>2</sup>	19
1,1,1 TCA	200	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2 Dichloroethane	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2 Hexanone		BDL	BDL	BDL	BDL	BDL	BDL	14	18	BDL	BDL	BDL	BDL
2-Butanone		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Vinyl Chloride	2	BDL	BDL	BDL	BDL	BDL	BDL	17	10	BDL	BDL	BDL	BDL

Notes: All values are in ug/L ( micrograms per liter or parts per billion)  
 BDL Below method detection limited using EPA SW-846 Method 8240  
 for VOCs and 8270 for SVOCs.  
<sup>1</sup> Residential cleanup scenario.  
<sup>3</sup> Value requalified as estimated.

B Indicates analyte detected in field blank which was collected by passing distilled water through a submersible pump.  
 NA Not Analyzed  
<sup>2</sup> Considered to be sampling or laboratory artifacts based on the results resampling duplicate and split samples.  
<sup>4</sup> Total cis and trans 1,2-dichloroethene

**TABLE 3  
GROUNDWATER SAMPLING RESULTS  
CAM-OR SITE - WESTVILLE, INDIANA**

Constituent	IDEM VRP Cleanup Goals¹	MW-3D							MW-4S	MW-4D		
		Nov '92	June'93	Aug '93	June '94	Jan '96	Mar '96	Mar '96 Duplicate	Jan '96	Jan'96	Mar '96	July'96
Semi-Volatiles by 8270												
bis (2-EH) Phthalate	6	BDL	'BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	41	BDL
Dimethylphthalate	304,000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Methylnaphthene		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dioxane		NA	NA	NA	NA	1,600	1,200²	900	BDL	91²	260	230
2,4 Dimethylphenol		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Volatiles by 8240												
Acetone	3,040	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroethane	23,160.75	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloromethane		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2 DCE	70	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrahydrofuran		230	60	48	46	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethene	5	BDL	BDL	BDL	BDL	1,100B	BDL	BDL	BDL	BDL	BDL	BDL
1,1 Dichloroethane	640	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1 TCA	200	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2 Dichloroethane	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Butanone		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes: All values are in ug/L ( micrograms per liter or parts per billion)  
BDL Below method detection limited using EPA SW-846 Method 8240  
for VOCs and 8270 for SVOCs.  
<sup>1</sup> Residential cleanup scenario.  
<sup>3</sup> Value requalified as estimated.

B Indicates analyte detected in field blank which was collected by passing distilled water through a submersible pump.  
NA Not Analyzed  
<sup>2</sup> Considered to be sampling or laboratory artifacts based on the results resampling duplicate and split samples.  
<sup>4</sup> Total cis and trans 1,2-dichloroethene

**TABLE 3  
GROUNDWATER SAMPLING RESULTS  
CAM-OR SITE - WESTVILLE, INDIANA**

Constituent	IDEM VRP Cleanup Goals¹	MW-4XD			MW5S		MW5S DUP	MW5D			MW5XD	MW6S	
		Jan '96	Mar'96	July '96	Jan '96	Mar '96	Jan '96	Jan '96	Mar '96	Mar '96 Dup	Jan '96	Jan 96	Mar '96
Semi-Volatiles by 8270													
bis (2-EH) Phthalate	6	BDL	130	BDL	BDL	BDL	BDL	12²	64	64	57²	BDL	BDL
Dimethylphthalate	304,000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	16²	BDL	BDL
2-Methylnaphene		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	35²	BDL
1,4-Dioxane		460²	550	230	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4 Dimethylphenol		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Volatilesby 8240													
Acetone	3,040	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroethane	23,160.75	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloromethane		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2 DCE	70	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5.4
Tetrahydrofuran		BDL	BDL	BDL	65²	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethene	5	BDL	BDL	BDL	560B²	BDL	600B²	600B²	BDL	BDL	BDL	580B²	BDL
1,1 Dichloroethane	640	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1 TCA	200	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2 Dichloroethane	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Butanone		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes: BDL All values are in ug/L ( micrograms per liter or parts per billion)  
Below method detection limited using EPA SW-846 Method 8240  
for VOCs and 8270 for SVOCs.  
1 Residential cleanup scenario.  
3 Value requalified as estimated.

B Indicates analyte detected in field blank which was collected by passing distilled water through a submersible pump.  
NA Not Analyzed

2 Considered to be sampling or laboratory artifacts based on the results resampling duplicate and split samples.  
4 Total cis and trans 1,2-dichloroethene

**TABLE 3  
GROUNDWATER SAMPLING RESULTS  
CAM-OR SITE - WESTVILLE, INDIANA**

Constituent	IDEM VRP Cleanup Goals <sup>1</sup>	MW6D		EQUIPMENT BLANK 1	EQUIPMENT BLANK 2	SMITH RESIDENCE	City Well No. 1						City Well No. 2
		Well Depth (in feet) →				55	150						125
		Jan '96	Mar '96	Jan '96	Jan '96	Mar '96	Dec '95	Mar '96	May '96	July '96	Sept '96	Oct '96	Dec '95
Semi-Volatiles by 8270													
bis (2-EH) Phthalate	6	12 <sup>2</sup>	39 <sup>2</sup>	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dimethylphthalate	304,000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Methylnaphene		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dioxane		12 <sup>2</sup>	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4 Dimethylphenol		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Volatiles by 8240													
Acetone	3,040	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroethane	23,160.75	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloromethane		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2 DCE	70	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Methylene Chloride		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrahydrofuran		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Trichloroethene	5	BDL	BDL	1600B <sup>2</sup>	480B <sup>2</sup>	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1 Dichloroethane	640	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1 TCA	200	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2 Dichloroethane	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Butanone		BDL	BDL	BDL	BDL	31	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes: All values are in ug/L ( micrograms per liter or parts per billion)  
BDL Below method detection limited using EPA SW-846 Method 8240  
for VOCs and 8270 for SVOCs.  
<sup>1</sup> Residential cleanup scenario.  
<sup>2</sup> Value requalified as estimated.

B Indicates analyte detected in field blank which was collected by passing distilled water through a submersible pump.  
NA Not Analyzed  
<sup>2</sup> Considered to be sampling or laboratory artifacts based on the results resampling duplicate and split samples.  
<sup>4</sup> Total cis and trans 1,2-dichloroethene

**TABLE 3  
GROUNDWATER SAMPLING RESULTS  
CAM-OR SITE - WESTVILLE, INDIANA**

	Bluhan Residence	Carr Service	Creed Concrete	Halford Residence	Next Door Food Store	Oasis Truck Stop	Oasis Motel
Well Depth (in feet) →	55	50	40	75	55	65	87
Constituent	5/8/96	5/9/96	5/8/96	5/96/96	10/24/96	5/8/96	10/24/96
Semi-Volatiles by 8270	BDL	BDL	BDL	BDL	NA	BDL	NA
Volatiles by 8240	BDL	BDL	BDL	BDL	NA	BDL	NA
1,4-dioxane	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	Parkman Residence	Tipton Rentals	Westpoint Lounge	Westville Estates (North)	Westville Estates (South)	Westville Correctional Center #3	
Well Depth (in feet) →	44	58	47	66	66	91	
Constituent	5/8/96	10/24/96	10/24/96	7/23/96	7/23/96	10/24/96	
Semi-Volatiles by 8270	BDL	NA	NA	NA	NA	NA	
Volatiles by 8240	BDL	NA	NA	NA	NA	NA	
1,4-dioxane	BDL	BDL	BDL	BDL	BDL	BDL	

Notes: All values are in ug/L ( micrograms per liter or parts per billion)  
BDL Below method detection limited using EPA SW-846 Method 8240  
for VOCs and 8270 for SVOCs.  
1 Residential cleanup scenario.  
3 Value requalified as estimated.

B Indicates analyte detected in field blank which was collected by passing distilled water through a submersible pump.  
NA Not Analyzed  
2 Considered to be sampling or laboratory artifacts based on the results resampling duplicate and split samples.  
4 Total cis and trans 1,2-dichloroethene

**TABLE 4**  
**MOBILE LABORATORY ANALYSES**  
**CAM-OR SITE - WESTVILLE, IN**

	P16 50'	P21 70'	MW4D 120'	MW4D 130'	MW4D 140'	MW4D 150'	MW5D 130'	MW5 150'
Chloromethane	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl chloride	<10	<10	<10	<10	<10	<2	<10	<10
Chloroethane	<10	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	<5	<5	<5	<5	<5	<5	<5	<5
Acetone	<25	72	49	46	31	<50	<25	32
Carbon disulfide	<5	<5	<5	<5	<5	<50	<5	<5
1,1-Dichloroethene	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethane	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,2-Dichloroethylene	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,2-Dichloroethene	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	<5	<5	<5	<5	<5	<5	<5	<5
2-Butanone	<25	<25	<25	<25	<25	<50	<25	<25
1,1,1-Trichloroethane	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl acetate	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,3-Dichloropropene	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	<5	<5	<5	<5	<5	<5	<5	<5
Dibromochloromethane	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	<5	<5	<5	<5	<5	<5	<5	<5
Benzene	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	<5	<5	<5	<5	<5	<5	<5	<5
2-Chloroethylvinyl ether	<50	<50	<50	<50	<50	<10	<50	<50
Bromoform	<5	<5	<5	<5	<5	<5	<5	<5
2-Hexanone	<25	<25	<25	<25	<25	<10	<25	<25
4-Methyl-2-pentanone	<25	<25	<25	<25	<25	<25	<25	<25
Tetrachloroethene	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	<5	<5	<5	<5	<5	<5	<5	<5
Styrene	<5	<5	<5	<5	<5	<5	<5	<5
Xylenes	<5	<5	<5	<5	<5	<5	<5	<5
Tetrahydrofuran	<5	18J	NA	NA	62J	<50	<5	<5
1,4-Dioxane	6.5J	69J	NA	NA	41J	NA	<1	<1

Notes: NA Not Analyzed

56

**TABLE 4**  
**MOBILE LABORATORY ANALYSES**  
**CAM-OR SITE - WESTVILLE, IN**

	P16 50'	P21 70'	MW4D 120'	MW4D 130'	MW4D 140'	MW4D 150'	MW5D 130'	MW5 150'
Acrolein	NA	NA	NA	NA	NA	<50	NA	NA
Acrylonitrile	<50	<50	<50	<50	<50	<50	<50	<50
Dibromomethane	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dibromo-3-chloropropane	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dibromoethane	<5	<5	<5	<5	<5	<5	<5	<5
Dichlorodifluoromethane	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	<5	<5	<5	<5	<5	<5	<5	<5
Ethyl ether	<5	<5	<5	<5	<5	<5	<5	<5
Ethyl acetate	<10	<10	<10	<10	<10	<10	<10	<10
Ethyl methacrylate	<10	<10	<10	<10	<10	<10	<10	<10
Methyl-tert-butyl-ether	<10	<10	<10	<10	<10	<10	<10	<10
Iodomethane	<10	<10	<10	<10	<10	<10	<10	<10
Paraldehyde	<10	<10	<10	<10	<10	<10	<10	<10
1,2,3-Trichloropropane	<10	<10	<10	<10	<10	<10	<10	<10
Trichlorofluoromethane	<5	<5	<5	<5	<5	<5	<5	<5

Notes: NA Not Analyzed

**APPENDIX A**

**FRIEDMAN & BRUYA REPORT**



FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Andrew John Friedman  
James E. Bruya, Ph.D.  
(206) 285-8282

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Seattle, WA 98119-2029  
FAX: (206) 283-5044

December 20, 1995

Ray Milejczak, Project Leader  
Dames & Moore  
2421 Production Drive, Suite 112  
Indianapolis, IN 46241

Dear Mr. Milejczak:

Enclosed are the results from the testing of material submitted on December 11, 1995 from your 13704-031-6008-045 project.

Sample P17; 12-14 contained three possible products: a light distillate such as Stoddard solvent or mineral spirits, a middle distillate such as diesel or heating oil, and a highly degraded or cracked product, such as heavy fuel oil, crude oil, or creosote. The light and middle distillates appear unweathered. A distinct pattern of *n*-alkanes from C<sub>9</sub> to C<sub>21</sub> is observed. *n*-Alkanes are easily digested by microorganisms and tend to disappear first as a product weathers.

The highly degraded or cracked product forms a broad hump from *n*-C<sub>8</sub> to *n*-C<sub>32</sub> with a maximum at *n*-C<sub>22</sub>. The light and medium distillates are the peaks on top of the hump. We suspect that the degraded product is a weathered heavy fuel oil such as Bunker C, crude oil, or creosote. The peak at 21 minutes on the GC/ECD trace could be pentachlorophenol, an additive to creosotes.

Sample P19; 12-14 appeared to contain material similar to P17; 12-14, but the light and middle distillates were very degraded. The distinctive *n*-alkane pattern seen in P17; 12-14 is not seen in P19; 12-14. The heavily degraded fuel oil, crude oil, or creosote is also a larger fraction of the contamination in P19; 12-14.

Your December 18, 1995 fax states the two soil samples were collected from a 12-14 foot depth. The groundwater is found at approximately 15 feet, and fluctuates one to two feet a year. The soil has a porosity of approximately 20-30%, decreasing near the ground surface. The soil is topped with grass. The porous soil, grass surface, and proximity to groundwater increase the flow of

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Ray Milejczak  
December 20, 1995  
Page 2

air and moisture to the sample zone. Though little macroscopic biological activity was present, some microbial degradation could be happening. We suspect that P17; 12-14 was collected closer to the contamination source. P19; 12-14 is likely to be closer to the edge of the plume. Microbial activity is often greater at the edge of a plume where the contamination serves as a food source, but has not reached toxic levels.

The site conditions and lack of weathering in the light and middle distillates of P17; 12-14 lead us to believe that the distillates were spilled within the last five years, or that several spills or a continuous leak has occurred. Though the distillates appear relatively fresh, some of contamination could be older than 5 years. P19; 12-14 is much more degraded, suggesting that the distillates were released at least three years ago. The complete lack of *n*-alkanes and sharp isoprenoid pattern from 16 to 18 minutes on the GC/FID trace is characteristic of material that could be up to 20 years old. With the limited site information and interferences from the heavy end product, we are unable to be highly accurate in our age determinations for P19; 12-14 and P17; 12-14.

Due to the ambiguity regarding its identity, we are unable to make an age date determination of the heavy end product. The possible presence of pentachlorophenol suggests it could be a creosote, as opposed to a fuel oil or crude oil.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Beth Albertson  
Chemist

keh  
Enclosures  
FAX: (317) 244-0421  
NAA1220R.DOC

Date of Report: December 20, 1995  
Date Received: December 11, 1995  
Project: 13704-031-6008-045  
Date Samples Extracted: December 12, 1995

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES  
FOR FINGERPRINT CHARACTERIZATION  
BY CAPILLARY GAS CHROMATOGRAPHY  
USING A FLAME IONIZATION DETECTOR (FID)  
AND ELECTRON CAPTURE DETECTOR (ECD)**

**Sample ID**

**GC Characterization**

P17; 12-14

The GC trace using the flame ionization detector (FID) showed the presence of low and medium boiling compounds. The low boiling compounds appeared as a pattern of peaks eluting from  $n$ -C<sub>6</sub> to  $n$ -C<sub>12</sub> showing a maximum near  $n$ -C<sub>10</sub>. The patterns displayed by these peaks are indicative of Stoddard solvent or mineral spirits. The GC/ECD trace showed low levels of oxygenated or halogenated compounds.

The medium boiling compounds appeared as a regular pattern of peaks eluting from  $n$ -C<sub>13</sub> to  $n$ -C<sub>21</sub> showing a maximum near  $n$ -C<sub>15</sub>. A regular pattern of the  $n$ -alkanes is seen for the medium boiling product. The patterns displayed by these peaks are indicative of diesel fuel or heating oil

A third highly degraded product is also present. This product forms a broad hump from  $n$ -C<sub>8</sub> to  $n$ -C<sub>32</sub>, with a maximum at  $n$ -C<sub>22</sub>. The product could be a highly weathered heavy fuel oil such as Bunker C, a heavily degraded crude oil, or a creosote. The single tall peak on the GC/ECD trace at 21 minutes could possibly be pentachlorophenol.

The large peak seen near 25 minutes on the GC/FID trace is pentacosane, added as a quality assurance check for this GC analysis. There is a second internal standard peak seen on the GC/ECD trace at about 26 minutes which is dibutyl chlorendate.

Date of Report: December 20, 1995

Date Received: December 11, 1995

Project: 13704-031-6008-045

Date Samples Extracted: December 12, 1995

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES  
FOR FINGERPRINT CHARACTERIZATION  
BY CAPILLARY GAS CHROMATOGRAPHY  
USING A FLAME IONIZATION DETECTOR (FID)  
AND ELECTRON CAPTURE DETECTOR (ECD)**

**Sample ID**

**GC Characterization**

P19; 12-14

The GC trace using the flame ionization detector (FID) showed the presence of low and medium boiling compounds. The low boiling compounds appeared as a ragged pattern of peaks eluting from  $n$ -C<sub>6</sub> to  $n$ -C<sub>12</sub> showing a maximum near  $n$ -C<sub>10</sub>. The patterns displayed by these peaks are indicative of weathered mineral spirits or Stoddard solvent. The GC/ECD trace showed low levels of oxygenated or halogenated compounds.

The medium boiling compounds appeared as a ragged pattern of peaks eluting from  $n$ -C<sub>13</sub> to  $n$ -C<sub>20</sub> showing a maximum near  $n$ -C<sub>13</sub>. A dominant pattern of  $n$ -alkanes was seen not for this material. The patterns displayed by these peaks are indicative of diesel fuel or heating oil. The medium boiling material present was highly degraded making product identification tentative.

A third highly degraded product may also be present. This product forms a broad hump from  $n$ -C<sub>8</sub> to  $n$ -C<sub>30</sub>, with a maximum at  $n$ -C<sub>23</sub>. The product could be a highly weathered heavy fuel oil such as Bunker C, a heavily degraded crude oil, or a creosote. The single tall peak on the GC/ECD trace at 21 minutes could possibly be pentachlorophenol.

The large peak seen near 25 minutes on the GC/FID trace is pentacosane, added as a quality assurance check for this GC analysis. There is a second internal standard peak seen on the GC/ECD trace at about 26 minutes which is dibutyl chlorophenol.

99

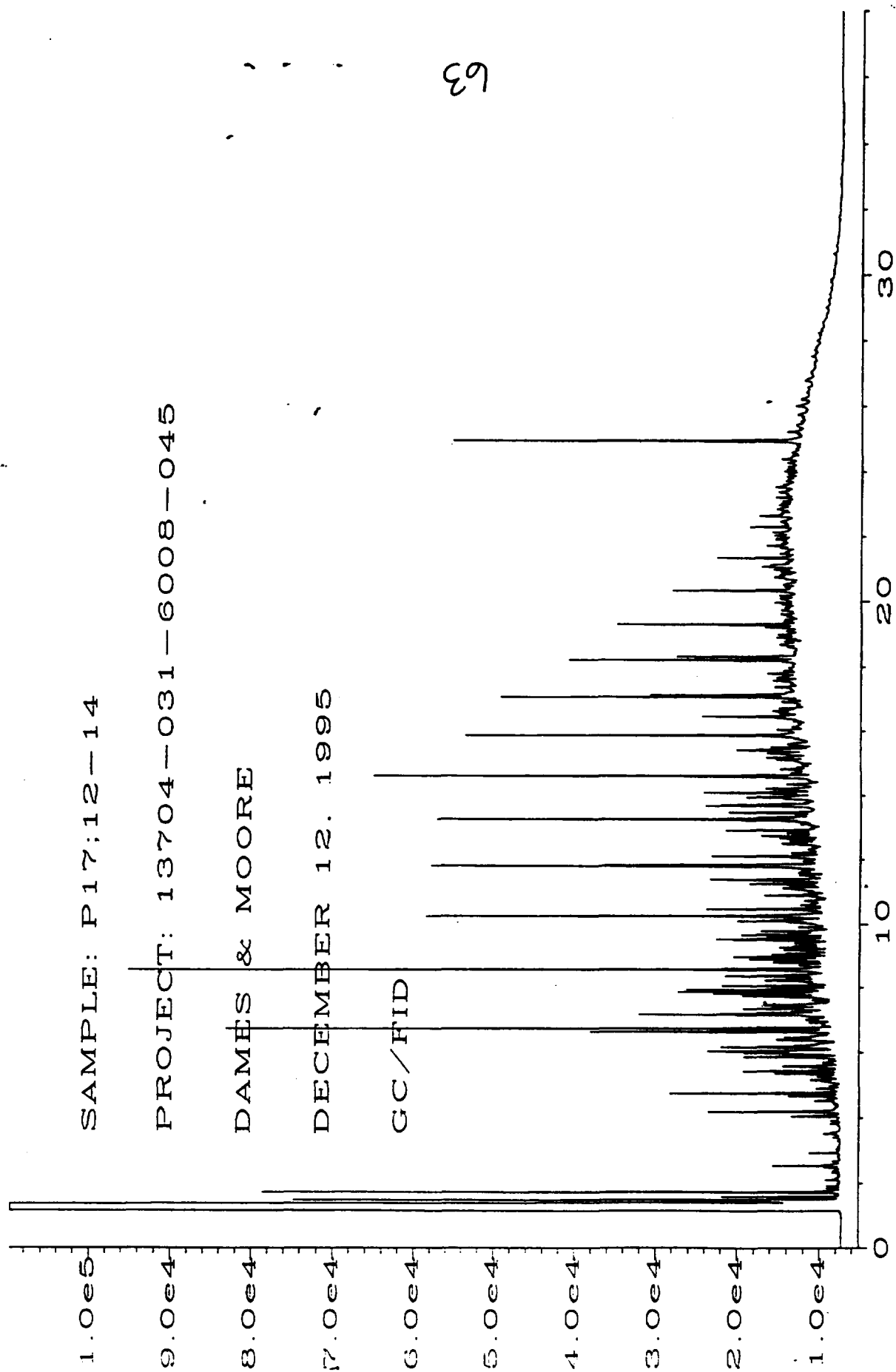
SAMPLE: P17:12-14

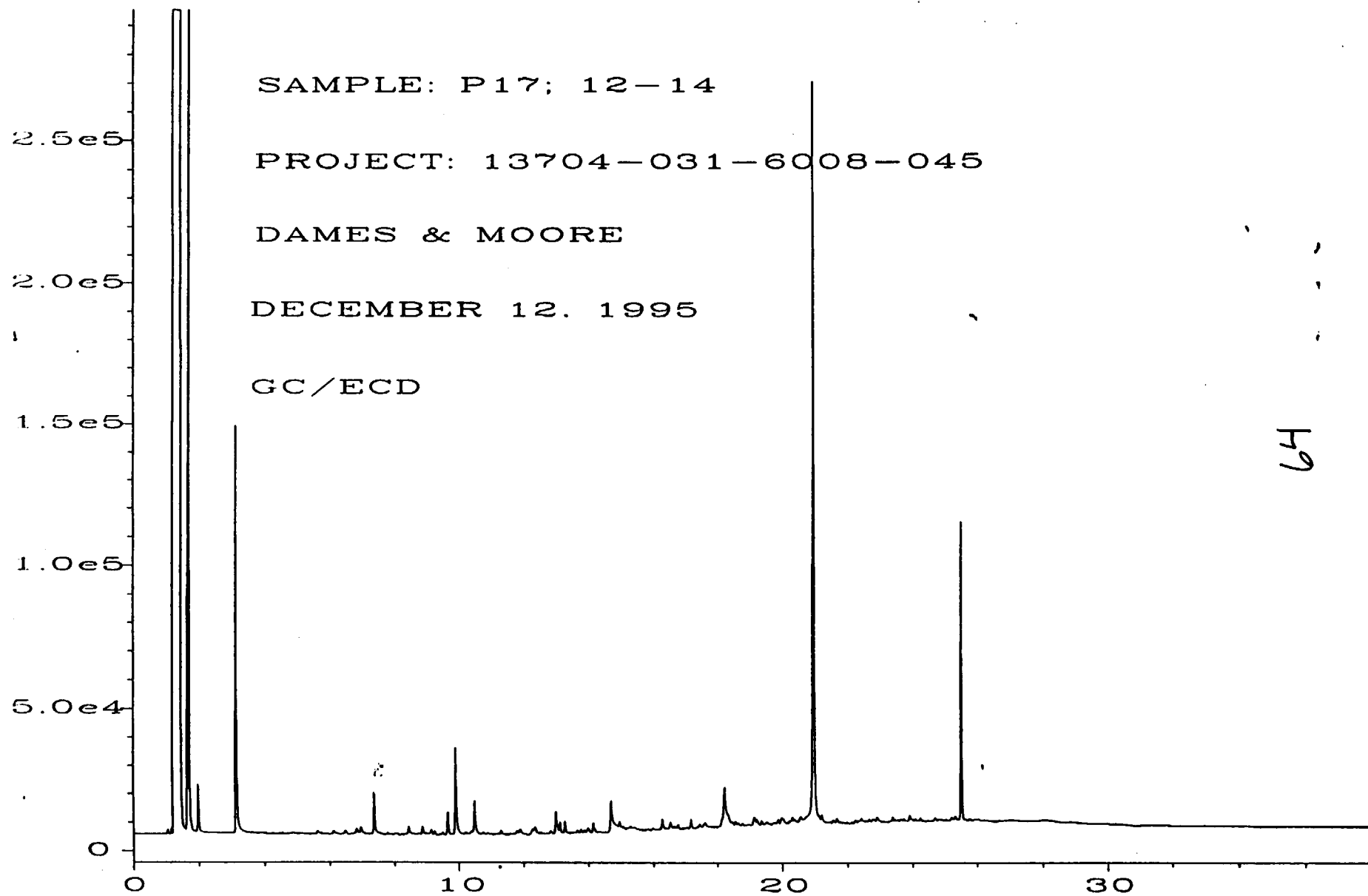
PROJECT: 13704-031-6008-045

DAMES & MOORE

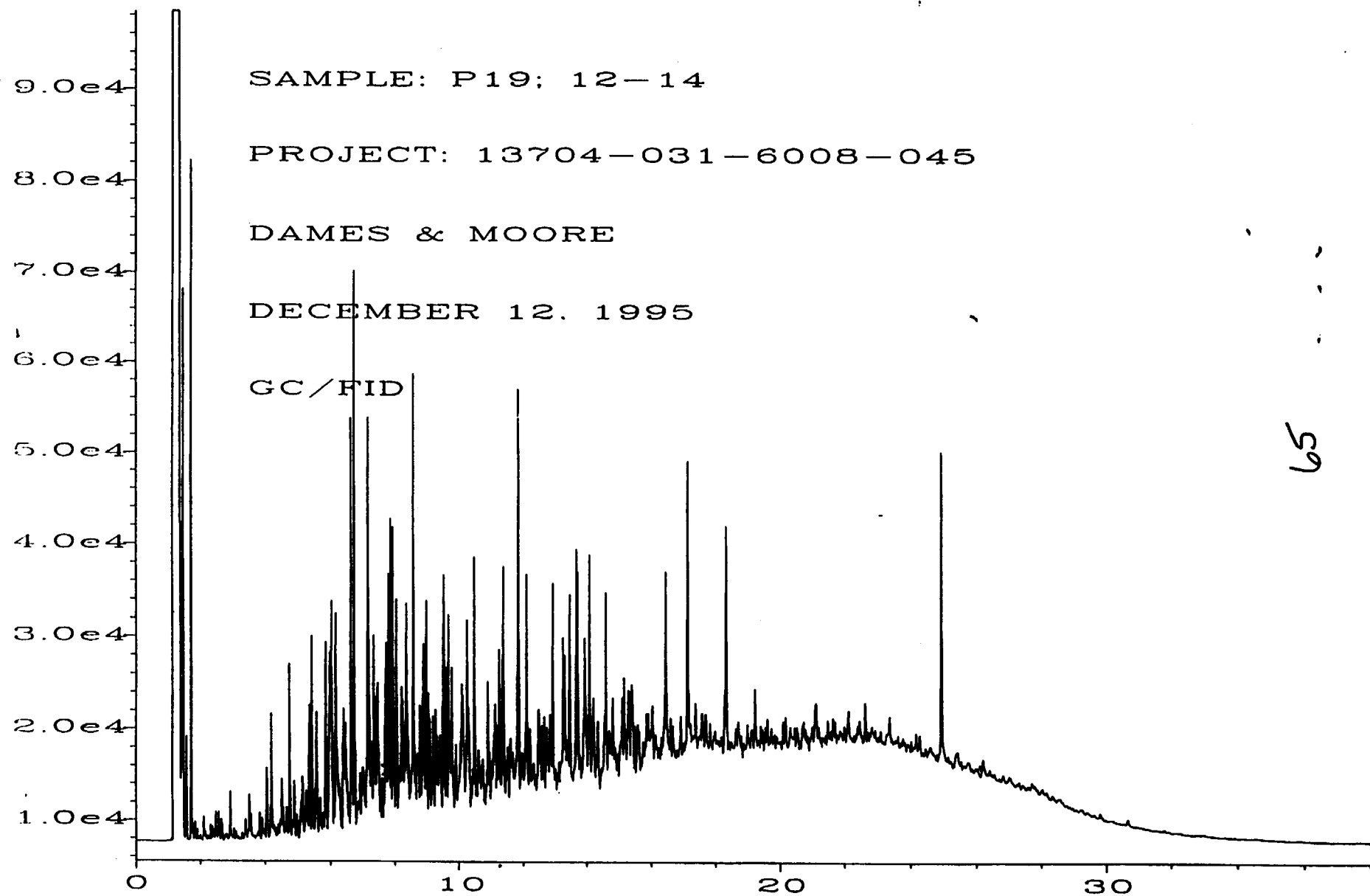
DECEMBER 12, 1995

GC/FID





59



66 . . .

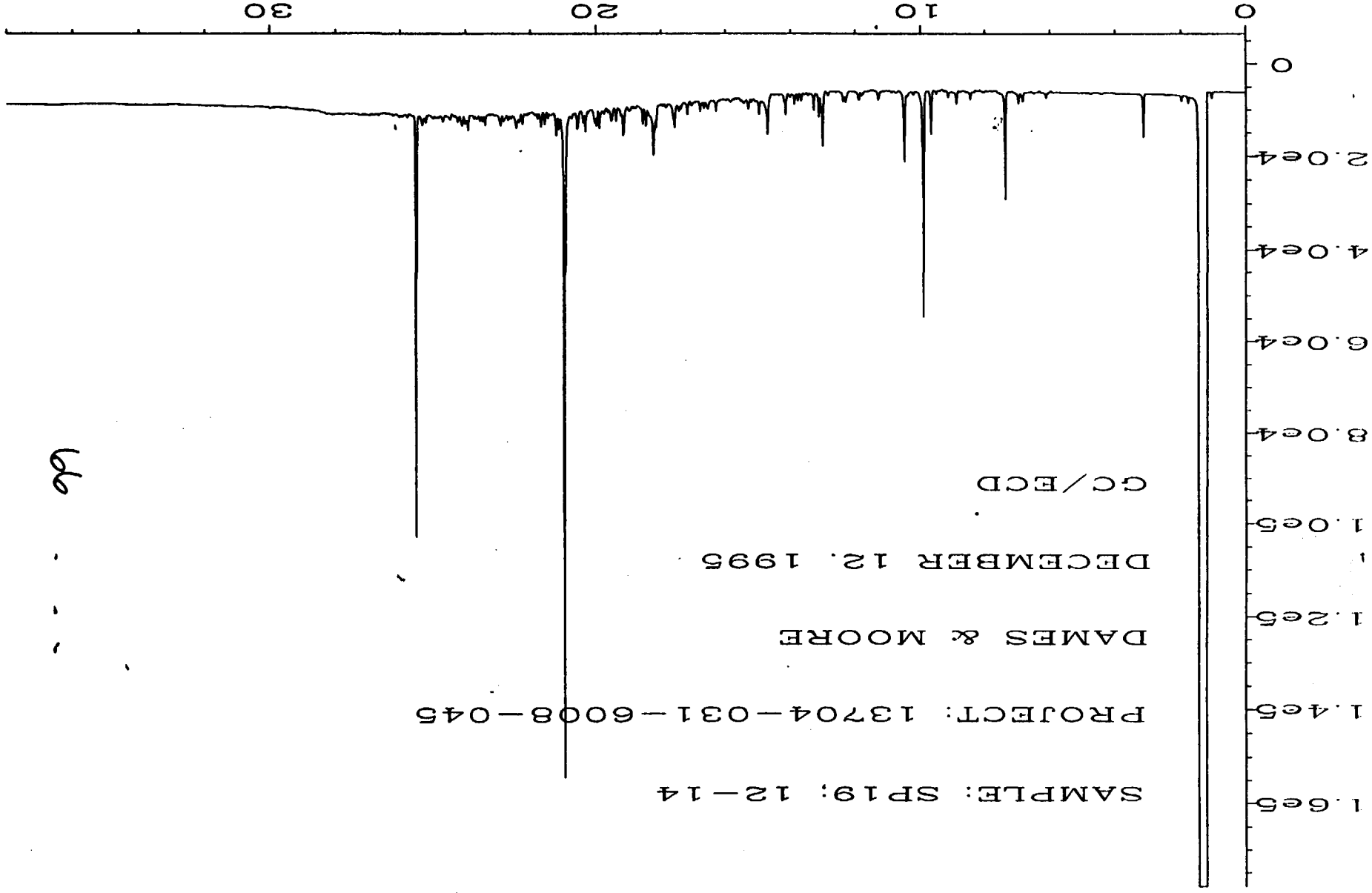
SAMPLE: SP19: 12-14

PROJECT: 13704-031-6008-045

DAMES & MOORE

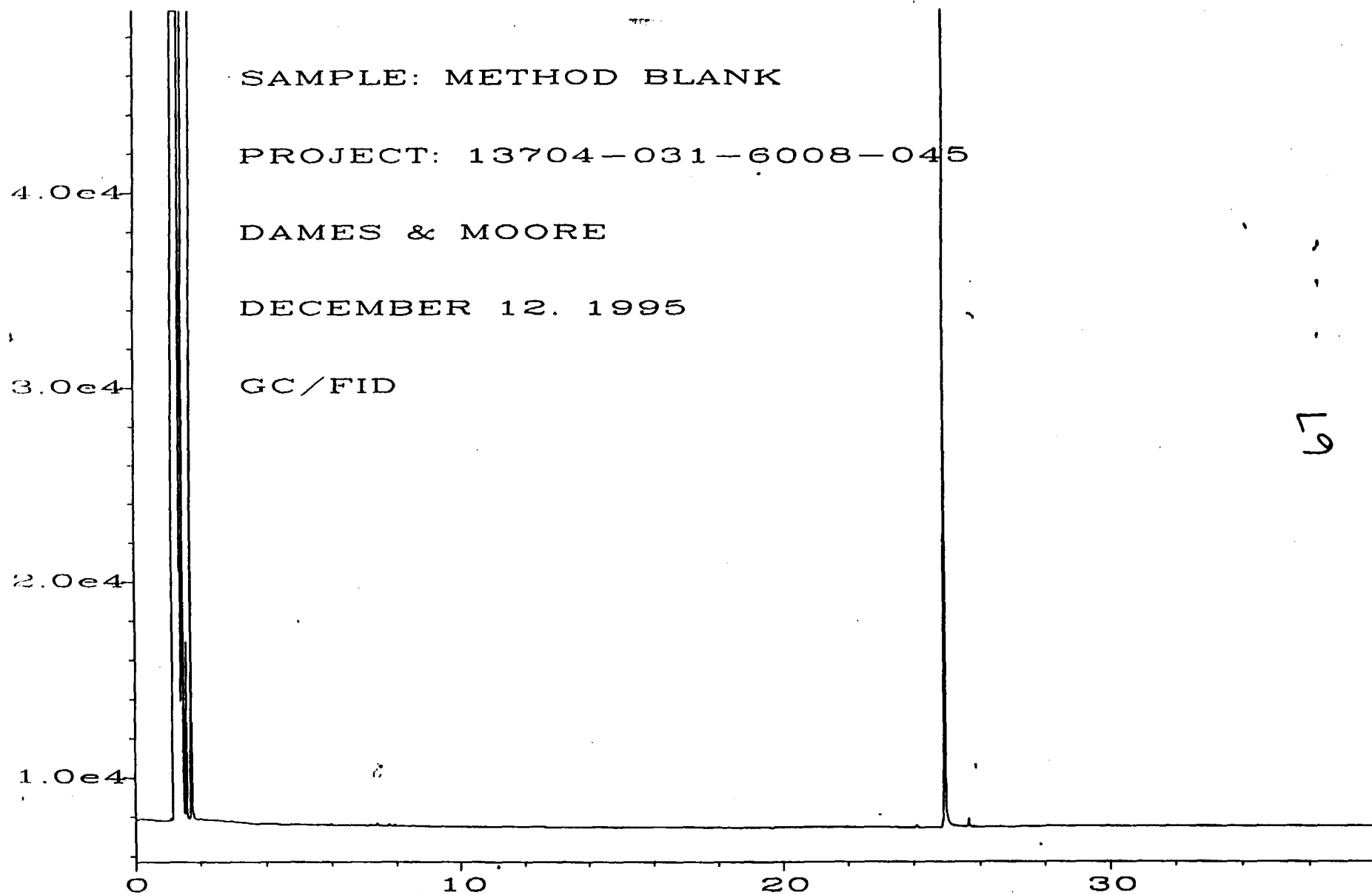
DECEMBER 12, 1995

GC/ECD





69



89

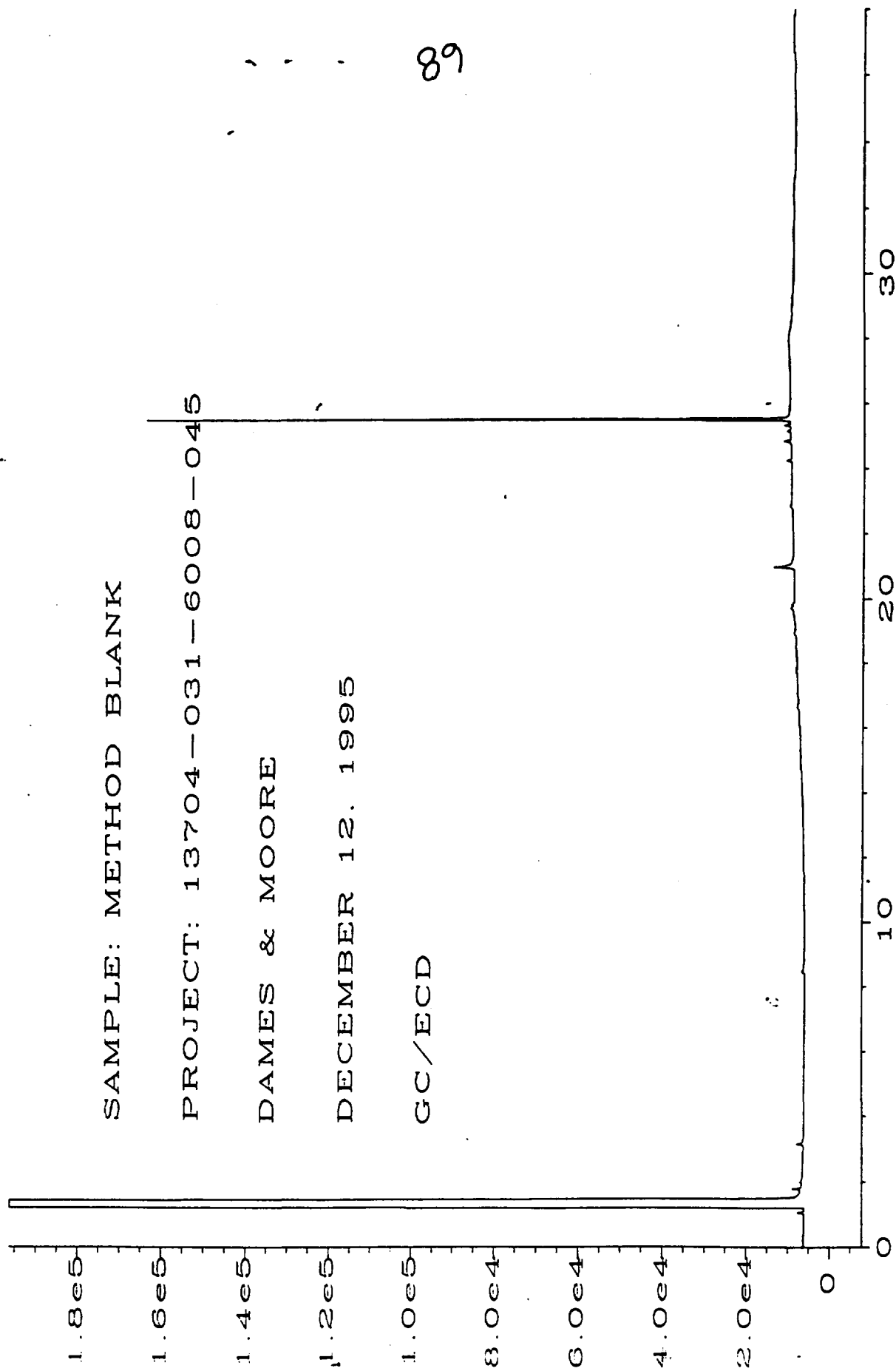
SAMPLE: METHOD BLANK

PROJECT: 13704-031-6008-045

DAMES & MOORE

DECEMBER 12. 1995

GC/ECD



**FRIEDMAN & BRUYA, INC.**  
**ENVIRONMENTAL CHEMISTS**

James E. Bruya, Ph.D.  
Beth M. Albertson, M.S.  
Bradley T. Benson  
Kelley D. Wilt

**AUG 19 1996**  
3012 16th Avenue West  
Seattle, WA 98119-2029  
TEL: (206) 285-8282  
FAX: (206) 283-5044

August 7, 1996

Ray Milejczak, Project Manager  
Dames & Moore  
2421 Production Drive Suite 112  
Indianapolis, IN 46241

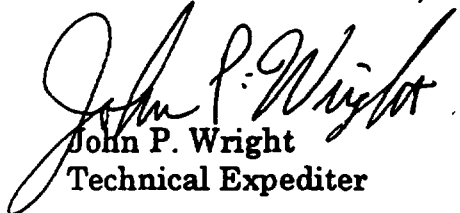
RE: Sample disposal for samples received on December 11, 1995 from Project  
13704-031-6008-045.

Dear Mr. Milejczak:

Enclosed is the original Chain of Custody form that accompanied samples sent to our laboratory for analysis. These forms are to accompany the samples at all times. Since these samples have now been disposed of or consumed during their analysis, we are returning them to you. We appreciate the opportunity to perform our testing service and hope you will consider the use of our laboratory in the future.

Sincerely,

FRIEDMAN & BRUYA, INC.

  
John P. Wright  
Technical Expediter

keh  
F&BI Sample Numbers 64852 to 64853

BA AC  
12.11.95

12.11.95

Job No.			Name & Address					Analysis										Remarks		Lab No.								
P.O./Contract No.			Project Title					Location																				
Sampler (signature)			Matrix					Comp																				
Sample I.D. No.			Date		Time		Preservative		No. of Containers		GC Characterization																	
P17; 12-14			12/8		15:20		Soil		✓		NONE										1		X		None of SR-2		64852	
P19; 12-14			12/8		17:20		Soil		✓		NONE										1		X		Some of SR-2		64853	
<p>Disposed of samples for Ray Mileyczak 4/22/96 <i>CD</i></p>																												

(//2 eljcr:cqap.doc)

**DAMES & MOORE**

INITIALS: CR

## SAMPLE CONDITION UPON RECEIPT CHECKLIST

1	Are custody seals present on cooler?		YES	<u>NO</u>
	If yes, are seals intact?		YES	NO
2	Cooler temperature:	<u>7°C</u>		
3	Are custody seals present on sample containers?		YES	<u>NO</u>
	If yes, are seals intact?		YES	NO
	Were samples radioactive?	<u>NOT TESTED</u>	YES	NO
5	Is there a Chain-of-Custody* (COC)?		<u>YES</u>	NO
	Is the COC* complete and in agreement with the samples received? # samples: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no    Sample ID's: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no    Date sampled: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no Matrix: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no    # containers: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <u>Not listed</u> Relinquished: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no    Requested analysis: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no		<u>YES</u>	NO
	Are the samples marked as being preserved?	<u>NO</u>		
6	Number of days samples have been sitting prior to receipt at laboratory	<u># DAYS</u> <u>2</u>		<input checked="" type="checkbox"/>
7	Were all sample containers received intact (i.e., not broken, leaking, etc.)?		<u>YES</u>	NO
8	Are the samples for volatile analyses on VOA vials?	<u>N/A</u>	YES	NO
9	Are samples requiring no headspace, headspace free?	<u>N/A</u>	YES	NO
10	Are VOA 1st stickers required?		YES	<u>NO</u>
11	Are there special comments on the Chain-of-Custody which require client contact?		YES	<u>NO</u>
12	If yes, was FBI Project Leader notified? Name _____		YES	NO

Describe "no" items: \_\_\_\_\_


Was client contacted? ☐ yes ☐ no

If yes, date: \_\_\_\_\_ Name of person contacted: \_\_\_\_\_

Describe actions taken or client instructions: \_\_\_\_\_

For other representative documents, letters, and/or shipping memos

TRACKING NUMBER



0867 332 579

**UPS Next Day Air®**

**APPENDIX B**

**MOBILE LABORATORY DATA**



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Analysis Date: DEC 5 1995

Operator: Mike Soja

Analyses: HVOC

Client: CAM-OR

Method: SW-846( 8010/8020)

			ANALYTICAL RESULTS			
COMPOUND	DETECTION LIMIT		P1-39'	P1-29'	P1-19'	P2-40'
	SOIL	WATER	WATER	WATER	WATER	WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	65/85%	6/120%	17/85%	4/80%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	ND	ND	1
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	134/107%	194/97%	20/100%	42/105%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	ND	ND	2
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	26/104%	15/100%	17/85%	11/110%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	81	181	ND	62
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	ND	ND	ND

Chemical Analyst: Michael Soja

Page 1 of 19

74

QA/QC

Michael Soja





# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Analysis Date: DEC 5 1995

Operator: Mike Soja

Analyses: HVOC

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS	
	SOIL	WATER	P2-20' WATER	P1-49' WATER
% Solids			NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	5/100%	4/80%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	17/85%	179/90%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	2/100%	8/80%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND
Acetone	5 ug/Kg	1 ug/L	ND	140
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	ND

Chemical Analyst:

Page 2 of 19

QA/QC:



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Analysis Date: DEC 6 1995  
Operator: Mike Soja

Analyses: HVOC

Client: CAM-OR  
Method: SW-846( 8010/8020)

COMPOUND	DETECTION LIMIT	
	SOIL	WATER
% Solids		
Dichlorodifluoromethane	25ug/Kg	5 ug/L
Chloromethane	25ug/Kg	5 ug/L
Vinyl Chloride	5 ug/Kg	1 ug/L
Bromomethane	5 ug/Kg	1 ug/L
Chloroethane	5 ug/Kg	1 ug/L
Trichlorofluoromethane	5 ug/Kg	1 ug/L
1,1-Dichloroethene	5 ug/Kg	1 ug/L
Methylene Chloride	25ug/Kg	5 ug/L
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L
1,1-Dichloroethane	5 ug/Kg	1 ug/L
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L
Carbon Tetrachloride	5 ug/Kg	1 ug/L
Benzene	5 ug/Kg	1 ug/L
1,2-Dichloroethane	5 ug/Kg	1 ug/L
Trichloroethene	5 ug/Kg	1 ug/L
1,2-Dichloropropane	5 ug/Kg	1 ug/L
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L
Bromodichloromethane	5 ug/Kg	1 ug/L
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L
Toluene	5 ug/Kg	1 ug/L
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L
Tetrachloroethene	5 ug/Kg	1 ug/L
Dibromochloromethane	5 ug/Kg	1 ug/L
Chlorobenzene	5 ug/Kg	1 ug/L
Ethylbenzene	5 ug/Kg	1 ug/L
P,M,O-Xylenes	15 ug/Kg	3 ug/L
Bromoform	5 ug/Kg	1 ug/L
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L
Acetone	5 ug/Kg	1 ug/L
Tetrahydrofuran	5 ug/Kg	1 ug/L

ANALYTICAL RESULTS			
P3-20' WATER	P3-40' WATER	P4-26' WATER	P4-40' WATER
NA	NA	NA	NA
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	* 14	ND
ND	ND	* 14	ND
ND	ND	ND	ND
32/107%	32/107%	23/115%	24/120%
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
24/120%	57/114%	46/92%	48/96%
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	5	8
22/110%	29/97%	21/105%	19/95%
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	169	ND
ND	ND	44	ND

\* These compounds co-elute.

Chemical Analyst: mill

Page 3 of 19

76

QAQC: DR



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project # : 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Analysis Date: DEC 6 1995

Operator: Mike Soja

Analyses: HVOC

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS	
	SOIL	WATER	P5-23'	P6-30'
			WATER	WATER
% Solids			NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	24/120%	31/103%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	19/95%	18/90%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	21/105%	28/93%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND
Acetone	5 ug/Kg	1 ug/L	ND	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	ND

Chemical Analyst: 

Page 4 of 19

77

QA/QC 



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Analysis Date: DEC 7 1995

Operator: Mike Soja

Analyses: HVOC

Client: CAM-OR

Method: SW-846( 8010/8020)

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS			
	SOIL	WATER	P4-26'	P8-30'	P8-45'	P9-20'
			WATER RE-ANALYSIS	WATER	WATER	WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	* 8	* 15	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	* 8	* 15	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	9/90%	10/100%	8/80%	30/100%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	11	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	1	ND	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	34/113%	19/95%	8/80%	14/93%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	ND	3	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	8/80%	37/93%	12/120%	37/93%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	171	229	133	71
Tetrahydrofuran	5 ug/Kg	1 ug/L	96	65	57	ND

\* These compounds co-elute.

Chemical Analyst: Mike Soja

Page 5 of 19

78

QA/QC: Mike Soja



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
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Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project # : 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Analysis Date: DEC 7 1995

Operator: Mike Soja

Analyses: HVOC

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS		
	SOIL	WATER	P9-40' WATER	P10-20' WATER	P10-40' WATER
% Solids			NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	63/105%	33/110%	49/98%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	13	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	41/103%	33/110%	61/102%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	7	3	4
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	101/101%	46/92%	106/106%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	18	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	5	9
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	92	60	316
Tetrahydrofuran	5 ug/Kg	1 ug/L	310	2294	1598

Chemical Analyst: Mike Soja

Page 6 of 19

79

QA/QC: [Signature]



# LANDMARK

FIELD ANALYTICAL & SAMPLING

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2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project # : 95-474-01

Analysis Date: DEC 8 1995  
Operator: Mike Soja

Analyses: HVOC

Client: CAM-OR

Method: SW-846( 8010/8020)

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS			
	SOIL	WATER	P11-40' WATER	P12-45' WATER	P13-24' WATER	P14-23' WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	16/80%	16/80%	16/80%	12/120%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	1	ND	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	30/100%	24/120%	16/80%	16/80%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	9	ND	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	19/95%	21/105%	19/95%	17/85%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	4	ND	ND	3
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	46	30	28	30
Tetrahydrofuran	5 ug/Kg	1 ug/L	16	ND	ND	ND

Chemical Analyst: *Mike Soja*

Page 7 of 19

80

QA/QC: *D. E. [Signature]*



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Client: CAM-OR  
Method: SW-846( 8010/8020)

Analysis Date: DEC 8 1995

Operator: Mike Soja

Analyses: HVOC

			ANALYTICAL RESULTS			
COMPOUND	DETECTION LIMIT		P11-20'	P12-30'	P13-40'	P7-15'
	SOIL	WATER	WATER	WATER	WATER	WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	2	2	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	12/120%	10/100%	6/120%	5/100%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	19/95%	5/100%	24/120%	17/85%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	15/100%	10/100%	12/120%	14/93%
Trans-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	ND	ND	ND

Chemical Analyst: *Michael Soja*

Page 8 of 19

81

QA/QC: *[Signature]*



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Client: CAM-OR  
Method: SW-846( 8010/8020)

Analysis Date: DEC 11 1995  
Operator: Mike Soja

Analyses: HVOC

COMPOUND  
DETECTION LIMIT  
SOIL WATER

% Solids  
Dichlorodifluoromethane 25ug/Kg 5 ug/L  
Chloromethane 25ug/Kg 5 ug/L  
Vinyl Chloride 5 ug/Kg 1 ug/L  
Bromomethane 5 ug/Kg 1 ug/L  
Chloroethane 5 ug/Kg 1 ug/L  
Trichlorofluoromethane 5 ug/Kg 1 ug/L  
1,1-Dichloroethene 5 ug/Kg 1 ug/L  
Methylene Chloride 25ug/Kg 5 ug/L  
Trans-1,2-Dichloroethene 5 ug/Kg 1 ug/L  
1,1-Dichloroethane 5 ug/Kg 1 ug/L  
Cis-1,2-Dichloroethene 5 ug/Kg 1 ug/L  
Bromochloromethane (Surrogate) 5 ug/Kg 1 ug/L  
1,1,1-Trichloroethane 5 ug/Kg 1 ug/L  
Carbon Tetrachloride 5 ug/Kg 1 ug/L  
Benzene 5 ug/Kg 1 ug/L  
1,2-Dichloroethane 5 ug/Kg 1 ug/L  
Trichloroethene 5 ug/Kg 1 ug/L  
1,2-Dichloropropane 5 ug/Kg 1 ug/L  
Trifluorotoluene (Surrogate) 5 ug/Kg 1 ug/L  
Bromodichloromethane 5 ug/Kg 1 ug/L  
Cis-1,3-Dichloropropane 5 ug/Kg 1 ug/L  
Toluene 5 ug/Kg 1 ug/L  
2-Bromo-1-Chloropropane (Surrogate) 5 ug/Kg 1 ug/L  
Trans-1,3-Dichloropropane 5 ug/Kg 1 ug/L  
1,1,2-Trichloroethane 5 ug/Kg 1 ug/L  
Tetrachloroethene 5 ug/Kg 1 ug/L  
Dibromochloromethane 5 ug/Kg 1 ug/L  
Chlorobenzene 5 ug/Kg 1 ug/L  
Ethylbenzene 5 ug/Kg 1 ug/L  
P,M,O-Xylenes 15 ug/Kg 3 ug/L  
Bromoform 5 ug/Kg 1 ug/L  
1,1,2,2-Tetrachloroethane 5 ug/Kg 1 ug/L  
1,3-Dichlorobenzene 5 ug/Kg 1 ug/L  
1,4-Dichlorobenzene 5 ug/Kg 1 ug/L  
1,2-Dichlorobenzene 5 ug/Kg 1 ug/L  
Acetone 5 ug/Kg 1 ug/L  
Tetrahydrofuran 5 ug/Kg 1 ug/L

## ANALYTICAL RESULTS

P15-23'	P20-23'	MW4D-140'	P16-50'
WATER	WATER	WATER	WATER
NA	NA	NA	NA
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
29/97%	28/93%	45/113%	39/98%
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
18/90%	17/85%	44/110%	23/115%
ND	ND	ND	ND
ND	ND	3	ND
22/110%	19/95%	32/107%	40/100%
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	5	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
ND	ND	ND	ND
29	ND	68	16
ND	44	534	1626

Chemical Analyst: Mike Soja

Page 9 of 19

82

QA/QC: [Signature]





# LANDMARK

FIELD ANALYTICAL & SAMPLING

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Suite # 112  
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ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Analysis Date: DEC 11 1995

Operator: Mike Soja

Analyses: HVOC

			ANALYTICAL RESULTS		
COMPOUND	DETECTION LIMIT		MW4D-150'	MW4D-80'	MW4D-60'
	SOIL	WATER	WATER	WATER	WATER
% Solids			NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	11/110%	11/110%	12/120%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	27/90%	78/104%	77/103%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	3	3	3
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	21/105%	22/110%	24/120%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	41	108	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	111	ND	ND

Chemical Analyst: Mike Soja

Page 10 of 19

93

QA/QC: [Signature]



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Analysis Date: DEC 12 1995  
Operator: Mike Soja

Analyses: HVOC

Client: CAM-OR

Method: SW-846( 8010/8020)

			ANALYTICAL RESULTS			
COMPOUND	DETECTION LIMIT		P21-70'	P21-90'	MW4D-120'	MW4D-130'
	SOIL	WATER	WATER	WATER	WATER	WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	45/90%	19/95%	15/100%	9/90%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	7	6	ND	3
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	145/97%	170/113%	32/107%	54/108%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	2	ND	2	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	33/110%	24/120%	24/120%	17/85%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	221	196	70	132
Tetrahydrofuran	5 ug/Kg	1 ug/L	413	164	42	1073

Chemical Analyst: Mike Soja

Page 11 of 19

84

QA/QC: [Signature]



# LANDMARK

FIELD ANALYTICAL & SAMPLING

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Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Analysis Date: DEC 13 1995

Operator: Mike Soja

Analyses: HVOC

Client: CAM-OR

Method: SW-846( 8010/8020)

			ANALYTICAL RESULTS			
COMPOUND	DETECTION LIMIT		P21-110'	P7-50'	P7-20'	P7-30'
	SOIL	WATER	WATER	WATER	WATER	WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	12/120%	9/90%	9/90%	9/90%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	4	ND	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	132/106%	16/80%	17/85%	17/85%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	10/100%	21/105%	18/90%	21/105%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	67	ND	ND	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	ND	ND	ND

Chemical Analyst: amit Soja

Page 12 of 19

85

QA/QC: [Signature]



# LANDMARK

FIELD ANALYTICAL & SAMPLING

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Benton Harbor, Michigan 49023-1047  
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Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Analysis Date: DEC 13 1995

Operator: Mike Soja

Analyses: HVOC

Client: CAM-OR

Method: SW-846( 8010/8020)

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS			
	SOIL	WATER	P7-70' WATER	P7-40' WATER	MW4D-100' WATER	P16-20' WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	14/93%	37/93%	31/103%	5/100%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	ND	ND	2
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	16/80%	24/120%	65/87%	15/100%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	25/100%	39/98%	34/113%	20/100%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	2
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	ND	ND	31	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	ND	224	ND

Chemical Analyst: Mike Soja

Page 13 of 19

86

QA/QC: Mike Soja



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
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Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01  
Client: CAM-OR  
Method: SW-846( 8010/8020)

Analysis Date: DEC 14 1995

Operator: Mike Soja

Analyses: HVOC

		ANALYTICAL RESULTS	
COMPOUND	DETECTION LIMIT SOIL WATER	MW4D BLOWDOWN WATER	P7-60' WATER
% Solids		NA	NA
Dichlorodifluoromethane	25ug/Kg 5 ug/L	ND	ND
Chloromethane	25ug/Kg 5 ug/L	ND	ND
Vinyl Chloride	5 ug/Kg 1 ug/L	ND	ND
Bromomethane	5 ug/Kg 1 ug/L	ND	ND
Chloroethane	5 ug/Kg 1 ug/L	ND	ND
Trichlorofluoromethane	5 ug/Kg 1 ug/L	ND	ND
1,1-Dichloroethene	5 ug/Kg 1 ug/L	ND	ND
Methylene Chloride	25ug/Kg 5 ug/L	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg 1 ug/L	ND	ND
1,1-Dichloroethane	5 ug/Kg 1 ug/L	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg 1 ug/L	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg 1 ug/L	60/120%	8/80%
1,1,1-Trichloroethane	5 ug/Kg 1 ug/L	ND	ND
Carbon Tetrachloride	5 ug/Kg 1 ug/L	ND	ND
Benzene	5 ug/Kg 1 ug/L	ND	ND
1,2-Dichloroethane	5 ug/Kg 1 ug/L	ND	ND
Trichloroethene	5 ug/Kg 1 ug/L	ND	ND
1,2-Dichloropropane	5 ug/Kg 1 ug/L	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg 1 ug/L	53/106%	16/80%
Bromodichloromethane	5 ug/Kg 1 ug/L	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg 1 ug/L	ND	ND
Toluene	5 ug/Kg 1 ug/L	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg 1 ug/L	9/90%	21/105%
Trans-1,3-Dichloropropene	5 ug/Kg 1 ug/L	ND	ND
1,1,2-Trichloroethane	5 ug/Kg 1 ug/L	ND	ND
Tetrachloroethene	5 ug/Kg 1 ug/L	ND	ND
Dibromochloromethane	5 ug/Kg 1 ug/L	ND	ND
Chlorobenzene	5 ug/Kg 1 ug/L	ND	ND
Ethylbenzene	5 ug/Kg 1 ug/L	ND	ND
P,M,O-Xylenes	15 ug/Kg 3 ug/L	ND	ND
Bromoform	5 ug/Kg 1 ug/L	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg 1 ug/L	ND	ND
1,3-Dichlorobenzene	5 ug/Kg 1 ug/L	ND	ND
1,4-Dichlorobenzene	5 ug/Kg 1 ug/L	ND	ND
1,2-Dichlorobenzene	5 ug/Kg 1 ug/L	ND	ND
Acetone	5 ug/Kg 1 ug/L	38	ND
Tetrahydrofuran	5 ug/Kg 1 ug/L	86	ND

Chemical Analyst: Mike Soja



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
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Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01  
Client: CAM-OR  
Method: SW-846( 8010/8020)

Analysis Date: DEC 14 1995

Operator: Mike Soja

Analyses: HVOC

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS			
	SOIL	WATER	P16-60' WATER	P16-30' WATER	P16-40' WATER	P16-70' WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	43/86%	27/90%	58/116%	18/90%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	1	ND	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	21/105%	18/90%	20/100%	16/80%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	9	4	8	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	59/118%	29/97%	16/80%	17/85%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	15	ND	ND	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	506	121	485	423

Chemical Analyst: amilejczak

Page 15 of 19

88

QAC: [Signature]



# LANDMARK

FIELD ANALYTICAL & SAMPLING

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Benton Harbor, Michigan 49023-1047  
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2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Analysis Date: DEC 15 1995

Operator: Mike Soja

Analyses: HVOC

			ANALYTICAL RESULTS			
COMPOUND	DETECTION LIMIT		P16-80'	MW5D-80'	MW5D-90'	MW5D-100'
	SOIL	WATER	WATER	WATER	WATER	WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	9/90%	17/85%	10/100%	16/80%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	16/80%	17/85%	16/80%	17/85%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	2	ND	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	11/110%	17/85%	17/85%	17/85%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	24	ND	ND	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	27	ND	ND	ND

Chemical Analyst: Mike Soja

Page 16 of 19

89

QA/QC: [Signature]



# LANDMARK

FIELD ANALYTICAL & SAMPLING

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ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Analysis Date: DEC 15 1995

Operator: Mike Soja

Analyses: HVOC

			ANALYTICAL RESULTS			
COMPOUND	DETECTION LIMIT		MW5D-110'	MW4D-120'	MW4D-130'	MW4D-140'
	SOIL	WATER	WATER	WATER	WATER	WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ue/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	18/90%	9/90%	15/100%	8/80%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	17/85%	16/80%	17/85%	16/80%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	18/90%	14/93%	17/85%	14/93%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	ND	ND	ND

Chemical Analyst:

*Mike Soja*

Page 17 of 19 90

QA/QC:

*[Signature]*





# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Analysis Date: DEC 15 1995

Operator: Mike Soja

Analyses: HVOC

			ANALYTICAL RESULTS			
COMPOUND	DETECTION LIMIT		MWSD-150'	* P7-80'	COMPRESSOR	TANKER
	SOIL	WATER	WATER	WATER	CONDENSATE WATER	TRUCK WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	NT	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	NT	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	NT	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	15/100%	NT	40/100%	66/110%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Benzene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	16/80%	NT	16/80%	17/85%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Toluene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	16/80%	NT	10/100%	28/93%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	NT	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Acetone	5 ug/Kg	1 ug/L	ND	NT	ND	ND
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	ND	ND	ND

\* Sample Damaged

Chemical Analyst: Mike Soja

Page 18 of 19

QA/QC: P. De



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
Benton Harbor, Michigan 49023-1047  
(616)927-3366 FAX (616)927-3684

Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project #: 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Analysis Date: DEC 15 1995

Operator: Mike Soja

Analyses: HVOC

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS	
	SOIL	WATER	PIPE DOPE WATER	
% Solids			NA	
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	
Chloromethane	25ug/Kg	5 ug/L	ND	
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	
Bromomethane	5 ug/Kg	1 ug/L	ND	
Chloroethane	5 ug/Kg	1 ug/L	ND	
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	
Methylene Chloride	25ug/Kg	5 ug/L	ND	
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	18/90%	
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	
Benzene	5 ug/Kg	1 ug/L	ND	
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	
Trichloroethene	5 ug/Kg	1 ug/L	ND	
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	16/80%	
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	
Toluene	5 ug/Kg	1 ug/L	ND	
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	8/80%	
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	
Chlorobenzene	5 ug/Kg	1 ug/L	ND	
Ethylbenzene	5 ug/Kg	1 ug/L	ND	
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	
Bromoform	5 ug/Kg	1 ug/L	ND	
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	
Acetone	5 ug/Kg	1 ug/L	ND	
Tetrahydrofuran	5 ug/Kg	1 ug/L	ND	

Chemical Analyst: Mike Soja

Page 19 of 19

92

QA/QC: R. D. K.



# LANDMARK

FIELD ANALYTICAL & SAMPLING

115 West Main Street  
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Dames & Moore  
2421 Production Drive  
Suite # 112  
Indianapolis, IN. 46241  
ATTN: Mr. Ray Milejczak  
Project # : 95-474-01

Client: CAM-OR

Method: SW-846( 8010/8020)

Data file:  
Analysis Date: DEC 12 1995  
Operator: Mike Soja

Analyses: HVOC

COMPOUND	DETECTION LIMIT		ANALYTICAL RESULTS			
	SOIL	WATER	P21-70' WATER	P21-90' WATER	MW4D-120' WATER	MW4D-130' WATER
% Solids			NA	NA	NA	NA
Dichlorodifluoromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Chloromethane	25ug/Kg	5 ug/L	ND	ND	ND	ND
Vinyl Chloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromomethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichlorofluoromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Methylene Chloride	25ug/Kg	5 ug/L	ND	ND	ND	ND
Trans-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,2-Dichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Bromochloromethane (Surrogate)	5 ug/Kg	1 ug/L	45/90%	19/95%	15/100%	9/90%
1,1,1-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Benzene	5 ug/Kg	1 ug/L	7	6	ND	3
1,2-Dichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trichloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Trifluorotoluene (Surrogate)	5 ug/Kg	1 ug/L	145/97%	170/113%	32/107%	54/108%
Bromodichloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Cis-1,3-Dichloropropane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Toluene	5 ug/Kg	1 ug/L	2	ND	2	ND
2-Bromo-1-Chloropropane (Surrogate)	5 ug/Kg	1 ug/L	33/110%	24/120%	32/107%	17/85%
Trans-1,3-Dichloropropene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2-Trichloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Tetrachloroethene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Dibromochloromethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Chlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Ethylbenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
P,M,O-Xylenes	15 ug/Kg	3 ug/L	ND	ND	ND	ND
Bromoform	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,3-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,4-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
1,2-Dichlorobenzene	5 ug/Kg	1 ug/L	ND	ND	ND	ND
Acetone	5 ug/Kg	1 ug/L	221	196	70	132
Tetrahydrofuran	5 ug/Kg	1 ug/L	413	164	42	1073

Chemical Analyst: \_\_\_\_\_

93

QA/QC: \_\_\_\_\_

**APPENDIX C**

**BORING LOGS**

# BORING MW4XD

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
					0	
	12-18-95 1427	0	10	SM	10	
				SP		
	1407	0	20	GP	20	
				SP		
	1355	0	30		30	
	1342	0	40		40	
	1322	0	50		50	
	1258	0	60		60	
					70	

Black to gray fine to coarse grained silty SAND with gravel.

Gray to dark gray fine to coarse grained SAND and gravel. WATER SAMPLE COLLECTED

Cobble seam.  
WATER SAMPLE COLLECTED

Dark gray medium to coarse SAND.

WATER SAMPLE COLLECTED

Gray to dark gray medium to coarse SAND and gravel. WATER SAMPLE COLLECTED

WATER SAMPLE COLLECTED

Gray to dark gray medium to coarse SAND and gravel. WATER SAMPLE COLLECTED

## NOTE:

Water samples were collected between 10 and 120  
by GeoProbe on 12-21-95 at 10 foot intervals  
Soil samples collected from drilling cyclone

## LOG OF BORING

## DAMES & MOORE

# BORING MW4XD

(Continued)

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
	1241	0	70		70	SP
						WATER SAMPLE COLLECTED
	1226	0	80		80	
						Gray to dark gray fine SAND. WATER SAMPLE COLLECTED
	1205	0	90		90	
						WATER SAMPLE COLLECTED
	1150	0	100		100	
						Gray to dark gray fine SAND. WATER SAMPLE COLLECTED
	1125	0	110		110	
						WATER SAMPLE COLLECTED
	1100	0	120		120	
						Gray to dark gray fine SAND. WATER SAMPLE COLLECTED
	1-4-96 1630	0	130		130	
						WATER SAMPLE COLLECTED
					140	

## NOTE:

Water samples were collected between 10 and 120  
by GeoProbe on 12-21-95 at 10 foot intervals  
Soil samples collected from drilling cyclone

LOG OF BORING

DAMES & MOORE

# BORING MW4XD

(Continued)

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
	1-5-96 1430	0	140		140	
	1530	0	150		150	
					160	
					170	
					180	
					190	
					200	
					210	

SP

Gray to dark gray fine SAND. WATER SAMPLE COLLECTED

Gray to dark gray coarse SAND and gravel, shale chips.

WATER SAMPLE COLLECTED at 150 feet

Boring completed at depth of 150 feet on 01-05-96. Well MW4XD installed on 1/6/96.

Groundwater encountered at depth of 10 feet during drilling on 12-21-95.

## NOTE:

Water samples were collected between 10 and 120 by GeoProbe on 12-21-95 at 10 foot intervals  
Soil samples collected from drilling cyclone

LOG OF BORING

DAMES & MOORE

# BORING MW4XD(A)

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
					0	TOP
						SP
Results in ug/L		0	4 - 6	<input type="checkbox"/>		Topsoil surface. Farm field.
			8 - 10	<input type="checkbox"/>	10	Fine - coarse grained brown sand (wet).
		0	14 - 16	<input type="checkbox"/>		Dark gray to olive gray fine to coarse grained sand (wet)(organic odor).
	12-4-95 0930	0	18 - 20	<input type="checkbox"/>	20	WATER SAMPLE COLLECTED. Dark gray to olive gray fine to coarse grained sand (wet)(organic odor).
		0	24 - 26	<input checked="" type="checkbox"/>		
Acetone=181	0950	0	28 - 30	<input checked="" type="checkbox"/>	30	Brown to olive gray, fine-coarse grained sand (wet)(organic odor). WATER SAMPLE COLLECTED.
		0	34 - 36	<input checked="" type="checkbox"/>		
Acetone=81	1450	0	38 - 40	<input checked="" type="checkbox"/>	40	WATER SAMPLE COLLECTED. Brown to olive gray, fine-coarse grained sand (wet)(organic odor disappears).
		0	44 - 46	<input checked="" type="checkbox"/>		
Acetone=140	1630	0	49 - 52	<input checked="" type="checkbox"/>	50	WATER SAMPLE COLLECTED.
			60		60	Brown to olive gray to gray fine to coarse grained SAND. (Wet) WATER SAMPLE COLLECTED.
Toluene=3	12-6-95 1300	0			70	Begin to encounter gravel layers in medium to coarse SAND.

## NOTE:

This boring log is for the abandoned well site in the Crumpacker farm field. Boring grouted to surface.

LOG OF BORING

DAMES & MOORE



# BORING MW4XD(A)

(Continued)

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
Benzene=7 Toluene=2 Acetone=221 THF=413 dioxane=695	1345	0	70		70	SP
Toluene=3 Acetone=108	1420	0	80		80	
Benzene=6 Acetone=196 THF=164	1445	0	90		90	
Acetone=31 THF=224	1500	0	100		100	
Benzene=4 THF=67	1515	0	110		110	
Toluene=2 Acetone=70 THF=42 dioxane=4,800	12-7-95 0730	0	120		120	
Benzene=3 Acetone=132 THF=1,073 dioxane=5,800	1545	0	130		130	
					140	

WATER SAMPLE COLLECTED.

Brown to olive gray to gray fine to medium SAND with gravel seams. WATER SAMPLE COLLECTED  
Fine SAND, no gravel.

WATER SAMPLE COLLECTED

Gray to dark gray very fine SAND.  
WATER SAMPLE COLLECTED

WATER SAMPLE COLLECTED

Gray to dark gray fine SAND.  
WATER SAMPLE COLLECTED

Coarse grained SAND and gravel seams.

Gray to olive gray coarse SAND and gravel.  
WATER SAMPLE COLLECTED

## NOTE:

This boring log is for the abandoned well site in the Crumpacker farm field. Boring grouted to surface.

LOG OF BORING

DAMES & MOORE

# BORING MW4XD(A)

(Continued)

REMARKS	TIME COLLECTED	HEADSPACE (gpm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
Toluene=3 Acetone=68 THF=534 dioxane=41J	1605	0	140		140	SP
Toluene=3 Acetone=41 THF=111 dioxane=360	1645	0	150		150	
					160	
					170	
					180	
					190	
					200	
					210	

Gray to dark gray coarse SAND and gravel seams. WATER SAMPLE COLLECTED

Encountered shale chips in medium grained SAND and gravel.

Possible fractured top of bedrock. No sand in sample.

Boring completed at depth of 150 feet on 12-07-95. WATER SAMPLE COLLECTED

Groundwater encountered and samples taken starting at depth of 60 feet during drilling on 12-06-95. Soil samples collected from cyclone.

## NOTE:

This boring log is for the abandoned well site in the Crumacker farm field. Boring grouted to surface.

LOG OF BORING

DAMES & MOORE

# BORING MW5XD

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
Results in ug/L unless noted differently		0			0	GM
					10	SP
	12-6-95 0815	0	19		20	
	0915	0	30		30	
	1015	0	40		40	
	1115	0	50		50	
	1215	0	60		60	
					70	

Brownish yellow silty gravelly SAND with gravel.

Brownish yellow to black to olive gray fine to medium grained SAND and gravel.

Brownish yellow to black to gray medium grained SAND and gravel. WATER SAMPLE COLLECTED

WATER SAMPLE COLLECTED

Olive gray to gray medium SAND and gravel. WATER SAMPLE COLLECTED

WATER SAMPLE COLLECTED

Olive gray to gray fine to medium SAND and gravel. WATER SAMPLE COLLECTED

## NOTE:

Soil Samples Collected from Drilling Cyclone.  
Monitoring Well MW5XD installed on 12/16/96.

## LOG OF BORING

## DAMES & MOORE

# BORING MW5XD

(Continued)

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
Acetone=67	1315	0	70		70	SP
						WATER SAMPLE COLLECTED
	1415	0	80		80	
						Gray to dark gray very fine SAND. WATER SAMPLE COLLECTED
	12-14-95 1500	0	90		90	
						WATER SAMPLE COLLECTED
	1530	0	100		100	
						Gray to dark gray very fine SAND. WATER SAMPLE COLLECTED
	1600	0	110		110	
						WATER SAMPLE COLLECTED
	1630	0	120		120	
						Gray to dark gray very fine SAND. WATER SAMPLE COLLECTED
dioxane=1.9 mg/L	1700	0	130		130	
						WATER SAMPLE COLLECTED
					140	

## NOTE:

Soil Samples Collected from Drilling Cyclone.  
Monitoring Well MW5XD installed on 12/16/96.

LOG OF BORING

DAMES & MOORE

# BORING MW5XD

(Continued)

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
dioxane=2.4 mg/L	12-15-95 0830	0	140		140	SP
	0930	0	150		150	GM
					160	
					170	
					180	
					190	
					200	
					210	

Gray to dark gray very fine SAND.  
WATER SAMPLE COLLECTED

Gravel seam with cobbles, silt and coarse gray SAND.

Boring completed at depth of 150 feet on 12-15-95. WATER SAMPLE COLLECTED

Groundwater encountered at 20 during Geoprobe sampling on 12-6-95. Samples taken starting at depth of 90 feet during drilling on 12-14-95.

## NOTE:

Soil Samples Collected from Drilling Cyclone.  
Monitoring Well MW5XD installed on 12/16/96.

LOG OF BORING

DAMES & MOORE

# BORING MW6D

REMARKS	TIME COLLECTED	HEADSPACE (ppm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
					0	
						GC
						GRAVEL and yellowish brown silty clay with gravel.
						SP
						Olive gray to gray coarse to medium SAND and gravel.
Results in ug/L	2				10	
						Noticeable petroleum odor, sheen in water from Cyclone.
Benzene=2 Ethylbenzene=2	12-8-95 0930	100	20		20	
						Olive gray to gray to brown medium SAND and gravel. WATER SAMPLE COLLECTED
Toluene=4 THF=121	0945	50	30		30	
						WATER SAMPLE COLLECTED
						Petroleum odor no longer present.
Toluene=8 THF=485	1010	0	40		40	
						Gray to light gray fine to medium SAND. WATER SAMPLE COLLECTED
Acetone=16 THF=1,626 dioxane=6.5J	1035	0	50		50	
						WATER SAMPLE COLLECTED
Benzene=1 Toluene=9 Acetone=15 THF=506	1100	0	60		60	
						Gray to light gray fine to medium SAND. WATER SAMPLE COLLECTED
					70	

## NOTE:

Cyclone sampling method performed.  
Well installed on 1-9-96.

LOG OF BORING

DAMES & MOORE

# BORING MW6D

(Continued)

REMARKS	TIME COLLECTED	HEADSPACE (gpm)	SAMPLE DEPTH	SAMPLE TYPE	DEPTH (FT)	WATER LEVEL
THF=423	1130	0	70		70	SP
Toluene=2 Acetone=24 THF=27	1200	0	80		80	
					90	
					100	
					110	
					120	
					130	
					140	

Gray to light gray medium SAND with gravel seams.  
WATER SAMPLE COLLECTED

WATER SAMPLE COLLECTED  
Boring completed at depth of 80 feet on 01-09-96.  
Groundwater encountered and samples taken  
starting at depth of 20 feet during drilling on  
12-08-95.

## NOTE:

Cyclone sampling method performed.  
Well installed on 1-9-96.

LOG OF BORING

DAMES & MOORE

**APPENDIX D**

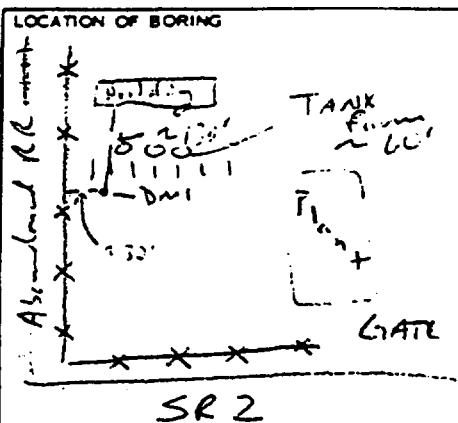
**SITE SOIL SAMPLE LOGS**



NO 6 U 38 06

DATE 7-10-96

928.1 (3) REV. 11-94



JOB NO. 13704-031		CLIENT CAM-OK	LOCATION West. H. In
DRILLING METHOD: Geo Probe			BORING NO. DM 1
SAMPLING METHOD: Autotech			SHEET 1 of 1
WATER LEVEL			DRILLING
TIME			START TIME 0735
DATE			FINISH TIME 0750
CASING DEPTH			DATE 7/10/96

DATUM		ELEVATION		CASING DEPTH		SURFACE CONDITIONS: <i>Tell me i weeks</i>	
SAMPLER TYPE	INCHES DRIVEN RECOVERED	DEPTH OF CASING	SAMPLE NO. DEPTH	BLOWS/FT. SAMPLER	PID NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	<i>48</i> <i>48</i>		<i>1</i> <i>0-4</i>		<i>322</i>	0	
						1	
						2	<i>SP</i>
						3	<i>SM</i>
AL	<i>48</i> <i>36</i>		<i>2</i> <i>4-8</i>		<i>51.5</i>	4	
						5	
						6	<i>SP</i>
						7	<i>SM</i>
AL	<i>48</i> <i>30</i>		<i>3</i> <i>8-12</i>		<i>336</i>	8	
						9	
						10	<i>SP</i>
						11	<i>SM</i>
AL	<i>48</i> <i>24</i>		<i>4</i> <i>12-14</i>		<i>283</i>	12	
						13	<i>SP</i>
						14	<i>SM</i>
						15	
						16	
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						301	
						302	

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

137.4-031

CAMER

1. Westville, TN

DRILLING METHOD:

Geo. Dr. Co.

BORING NO.

DM 2

SHEET

1 of 1

SAMPLING METHOD:

Acute Line

DRILLING

START

FINISH

TIME

TIME

WATER LEVEL

12 f. 3

TIME

0815

DATE

7-10-96

DATE

DATE

7/10/96

7/10/96

CASING DEPTH

DATUM

ELEVATION

SURFACE CONDITIONS:

Grass / Weeds / Small Trees

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48 42		1 0-4		19.7	0	SP
						1	SM
						2	
						3	
AL	48 36		2 4-8		65.3	4	SP
						5	SM
						6	
						7	
AL	48 42		5 8-12		231	8	SP
						9	SM
						0	
						1	
						2	
						3	
						4	
						5	
						6	
						7	
						8	
						9	
						0	

Yellowish brown to brown clay sand with organic inclusions

Yellowish brown to clayey fine to medium clay sand

Brown to clayey medium sand  
Bottom 18" is black sand  
Petroleum odor

Brown to black  
Groundwater encountered

NO. 2 J85

DATE 7-10-96 CHK'D BY

# JAMES & MOORE

LOCATION OF BORING		JOB NO. 1324-C21		CLIENT CHAMICK		LOCATION W. L. H. L.	
		DRILLING METHOD: GAS P.S.		BORING NO. DM3		SHEET 1 of 1	
		SAMPLING METHOD: A. L. L. C. L.		START TIME 0845		FINISH TIME 0906	
		WATER LEVEL		DATE 7/15/46		DATE 7/15/46	
TIME		DATE 7/15/46		DATE 7/15/46		DATE 7/15/46	
DATE		DATE 7/15/46		DATE 7/15/46		DATE 7/15/46	
CASING DEPTH		DATE 7/15/46		DATE 7/15/46		DATE 7/15/46	

SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	SAMPLE DEPTH	BLOWS/FT. SAMPLER	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS
AL	45	45	1	1	0-4	35.6	0	SP	Yellow loam to brown clay sand with occasional
AL	48	48	2	2	4-8	12.8	4	SP	Yellow loam to brown clay sand
AL	48	48	3	3	8-12	24.8	8	SP	Yellow loam to black sand and
AL	48	48	4	4	12-16	55.1	12	SP	Black sand and yellow loam to black sand
							1		
							2		
							3		
							4		
							5		
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Abundant R.R.

110

# Dames & Moore

LOCATION OF BORING		JOB NO.	CLIENT	LOCATION
		133-4-071	CAM-OK	Will. H. B.
		DRILLING METHOD: Geo. P. Co.		BORING NO.
				DMS
		SAMPLING METHOD: A. L. L. Co.		SHEET
				1 OF 1
				DRILLING
		WATER LEVEL	11.7	START TIME
		TIME		0925
		DATE		0940
		CASING DEPTH		DATE
				7/10/96
				7/10/96

DATUM SC 2 ELEVATION

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	P.D. NUMBER OF "RINGS"	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
AL	4/8 3L		1 0-8		40	0	CL	Yellow-brown silty clay
						1		Bottom 12" has sand with c.l. - pebbles - color
						2		
						3		
AL	4/8 2-1		2 4-8		56.3	4	P 5m ↓ 5m	Medium-grained black sand
						5		
						6		
						7		
AL	4/8 3L		3 8-11		47.4	8	P 5m ↓ 5m	Medium-grained black sand
						9		
						0		
						1		
AL	4/8 2-1		4 12-16		108	2	P 5m ↓ 5m	Medium-grained black sand
						3		
						4		
						5		
						6		Box terminated. Tip of sampler cut
						7		
						8		
						9		
						0		

DATE 7-12-96 CHK'D BY

28.1 (2) (REV. 11-84)

# Dames & Moore

LOCATION OF BORING		JOB NO.	CLIENT	LOCATION
<p>Abstract KK</p> <p>1" N</p> <p>SK 2</p> <p>GAIR</p>		D204-031	CLAM-OK	W. H. H. B.
		DRILLING METHOD: GeoProbe		BORING NO.
		SAMPLING METHOD: Acc. L. L. L.		SHEET
				1 of 1
		DRILLING		
		WATER LEVEL	12	START TIME
		TIME	1005	FINISH TIME
		DATE	7/10/96	DATE
		CASING DEPTH		DATE

DATUM	ELEVATION	SAMPLER TYPE	INCHES DRIVEN INCHES RECORDED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF WINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
		AL	48/36		1/0.4	25.1		0	SM	Yellow brown to brown silty sand with a...
								1		
								2		
								3		
		AL	48/30		2/4.8	56.8		4	CL	Yellow brown silty clay black with oil
								5		
								6		
								7		
		AL	48/36		3/8-12	80.6		8	SP-SA	Blackened medium sand Petroleum oil
								9		
								0		
								1		
								2		Brown brownish (1) (old) cemented
								3		
								4		
								5		
								6		
								7		
								8		
								9		
								0		

# Dames & Moore

LOCATION OF BORING <i>11N</i>		JOB NO. 13704-021	CLIENT CAM-CK	LOCATION Hickory, E
DRILLING METHOD: <i>Geo. P. 1.</i> SAMPLING METHOD: <i>Acute Line</i>		BORING NO. DMZ		
		SHEET 1 of 1		
WATER LEVEL 15 TIME 1:30 DATE 7/10/16		DRILLING START TIME 10:15 FINISH TIME 10:30 DATE 7/10/16 DATE 7/10/16		
CASING DEPTH				

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD NUMBER OF "RINGS"	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS: <i>Gravelly sand</i>
AC	48 36		1 0-4		6.6	0	sm	yellow-brown to brown silty sand
						1		
						2		
						3		
AC	48 24		2 4-8			4	sm	yellow-brown to tan gray medium sand
						5		
						6		
						7		
AC	48 36		3 8-12			8	cl	yellow-brown silty clay
						9		
						10		
						11		
AC	48 0		4 12-14			12		No sample Black sand in tip of sampler
						13		low sandstone
						14		
						15		
						16		
						17		
						18		
						19		
						20		

NO. J8420  
DATE 7/10/16  
CHK'D BY  
25.1 (2) (REV. 11-84)

# Dames & Moore

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13704-031

CAM-CR

West H. E

DRILLING METHOD: GeoProbe

BORING NO.

Dm 8

SHEET

1 of 1

SAMPLING METHOD: Acute Line

DRILLING

START TIME

FINISH TIME

1105 1130

DATE DATE

7/10/66 7/10/66

WATER LEVEL

TIME

DATE

CASING DEPTH

DATUM

ELEVATION

SAMPLER TYPE	INCHES DRIVER INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PD NUMBER OF "RINGS"	DEPTH IN FEET	SOIL GRAPH
AL	48 24		1 0-11		0	0	sm
AL	48 30		2 4-8		73.0	4	SP-SM
AL	48 21		3 8-11		75.8	8	SP-SM
AL	48 24		4 12-14		75.8	2	SP-SM

SURFACE CONDITIONS:

yellowish to brown silty sand with black sand in bottom of sample

Black sand (sand looks to be changing to) medium grained (gray to tan in color)

Black sand fine to medium grained

Black sand medium grained

Boring terminated

114

DRILLING CURVE

NO 008403

CHK'D BY

DATE 7/10/66

28.1 (3) (REV. 11-60)



# James & Moore

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13241-031

CAM-CK

Vista 11, J.

DRILLING METHOD: G.D.L.

BORING NO.

Dm 9

SHEET

1 of 1

SAMPLING METHOD: A.C. 1/2 in.

DRILLING

WATER LEVEL

12

TIME

11:50

DATE

7/10/96

CASING DEPTH

START

TIME

11:40

FINISH

TIME

11:50

DATE

7/10/96

DATE

7/10/96

DATUM

ELEVATION

SAMPLER TYPE	INCHES DRIVER INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PID NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48/36		1 0-4		0	0	Sm
						1	
						2	
						3	
AL	48/24		2 0-6		124	4	Sm
						5	
						6	
						7	
AL	48/18		3 0-12		306	8	
						9	
						10	
						11	
						12	
						13	
						14	
						15	
						16	
						17	
						18	
						19	
						20	

SURFACE CONDITIONS:

Yellowish-brown to brown silty sand with organic matter

181D

Black sand medium sand

Briny from water  
Fly D encountered

115

DRILLING CONTR.

No 2009500

DATE 7/10/96 CHK'D BY

20.1 (3) (REV. 11-88)

# James & Moore

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

1324-081

CHAMIC

10.1.11.2

DRILLING METHOD:

Gr. Pile

BORING NO.

DM10

SHEET

1 of 1

SAMPLING METHOD:

Alcohol Curve

DRILLING

WATER LEVEL

12

TIME

205

DATE

7/1/16

CASING DEPTH

START

FINISH

TIME

TIME

1155

1205

DATE

DATE

7/1/16

7/1/16

DATUM

SR 2

ELEVATION

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER P.D. NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48/36		1 0-4	92.9	0	SM
					1	
					2	
					3	
AL	48/24		2 4-8	3.8	4	CL
					5	
					6	
					7	
AL	48/24		3 8-12	220	8	SC
					9	
					10	
					11	
					12	
					13	
					14	
					15	
					16	
					17	
					18	
					19	
					20	

SURFACE CONDITIONS:

Grass & weeds

Yellow brown silty sand with organic

Yellow brown silty clay

Very wet, black, silty clayey sand

Boring Terminated  
Hyd. equipment

116

NO 2095

DATE 7/1/16

128.1 (3) (REV. 11-80)

# Dames & Moore

LOCATION OF BORING							JOB NO.		CLIENT		LOCATION			
							13704-C31		CAM-IX		11/11/11 E			
							DRILLING METHOD: Geo. P. S.						BORING NO.	
							SAMPLING METHOD: Acc. to L. L. L.						SHEET	
													1 of 1	
							DRILLING		START		FINISH			
							WATER LEVEL				TIME		TIME	
							TIME				1225		1240	
							DATE				DATE		DATE	
							CASING DEPTH				7/10/11		7/10/11	
DATUM							ELEVATION							
SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS: Tall grass						
AL	45 42		1 0-4		0	0	sm	Yellow brown to brown clay sand						
						1								
						2								
						3								
AL	45 18		2 1-8		238	4	sp-sm	16" yellow brown sand						
						5		12" of black sand with petroleum residue						
						6								
						7								
AL	45 24		3 5-12		645	8	sp-sm	Medium black sand petroleum residue						
						9								
						10								
						11								
AL	45 36		4 12-16		235	2	sp-sm	1B11						
						3								
						4								
						5								
						6		Boring Terminated						
						7								
						8								
						9								
						10		117						

NO. 950

DATE 7/10/11

20.1 (REV. 11-00)

# James & Moore

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13724-C31

Cham-cil

BORING NO.

DM12

DRLING METHOD: Hand Pile

SHEET

1 of 1

SAMPLING METHOD: Auger Core

DRLING

WATER LEVEL

START TIME

TIME

FINISH TIME

DATE

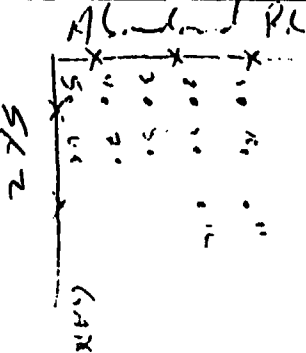
DATE

CASING DEPTH

DATE

DATUM

ELEVATION



NA

SAMPLER TYPE  
INCHES DRIVEN  
INCHES RECOVERED  
DEPTH OF CASING  
SAMPLE NO.  
SAMPLE DEPTH  
BLOWS/FT. SAMPLER  
DID NUMBER OF RINGS

DEPTH IN FEET

SOIL GRAPH

SURFACE CONDITIONS: Tall grass, weeds

Yellowish-brown clay sand

AL

48  
45

1

1-4

SM

0

SM

Yellowish-brown clay sand

AL

48  
24

2

4-8

SM

4

SM

Yellowish-brown clay sand

AL

48  
14

3

4-12

SC

8

SC

Orange-brown clay sand

AL

48  
14

4

4-16

SC

2

SC

18.0

Big tree wood

118

# James & Moore

LOCATION OF BORING		JOB NO. 1524-071	CLIENT CAM-ER	LOCATION W. St. H. E.
		DRILLING METHOD Geo Probe	BORING NO. DM13	
		SHEET 1 of 1		
SAMPLING METHOD Acid Line		DRILLING		
WATER LEVEL 11		START TIME 1400	FINISH TIME 1415	
TIME 1415		DATE 7/12/96	DATE 7/12/96	
DATE 7/12/96		CASING DEPTH		

DATUM SR 2 ELEVATION

SAMPLER TYPE	INCHES DRIVER INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
AL	48 24		1 0-4		0	0	SM	Ground: weeds
						1		
						2		
						3		
AL	48 24		2 4-8		21	4	SM	
						5		
						6		
						7		
AL	48 18		3 8-12		140	8	SM-SL	Yellowish to olive grey black sand
						9		
						10		
						11		Groundwater at ~ 11'
						12		Bore terminated O Groundwater encountered
						13		
						14		
						15		
						16		
						17		
						18		
						19		
						20		

# Dames & Moore

LOCATION OF BORING <i>7N</i>		JOB NO. 13204-01	CLIENT CAM-UK	LOCATION W. 11. 2
		DRILLING METHOD: <i>GeoProbe</i>		BORING NO. DM14
		SAMPLING METHOD: <i>Art. L. Line</i>		SHEET 1 of 1
DATUM <i>SL 2</i>		ELEVATION		DRILLING
		WATER LEVEL 12		START TIME 1430
		TIME 11/1/96		FINISH TIME 1445
		DATE 7/1/94		DATE 7/1/96
		CASING DEPTH		

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PID NUMBER OF RANGE	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
AL	48 36		1 0-4		15.2	0	SM	<i>Tall grass, weeds</i>
						1		
						2		
						3		
AL	48 24		2 0-8		52.4	4	SM	<i>Yellow brown to olive gray medium silty sand</i>
						5		
						6		
						7		
AL	48 24		3 0-12		23.5	8	SM	<i>Yellow brown to black medium sand, petroleum residue</i>
						9		
						10		
						11		
						12		
						13		
						14		
						15		
						16		
						17		
						18		
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						98		
						99		
						100		

*Boring Terminated  
Hydraulic*

NO 009500

DATE 7-12-96 CHK'D BY

# James & Moore

LOCATION OF BORING		JOB NO.		CLIENT		LOCATION	
Adams Rd. N.W.		1307-121		C.A.M.-CR		Loc. 11.2	
SR 2		DRILLING METHOD: Gas Pile		SHEET		BORING NO. 1 of 1	
		SAMPLING METHOD: Available		START TIME		FINISH TIME	
				1500		1515	
		DATE		7/1/96		7/3/96	
		CASING DEPTH					

DATUM	SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
	AC	48	31		1	10.4		7.6	0	SM	Yell. loess above clay sand
									1		
									2		
									3		
									4		
	AC	45	31		2	11.5		88.4	5	SM	Yell. loess to black medium sand
									6		
									7		
									8		
	AC	43	24		3	8.2		106	9	SM	Black medium sand
									10		
									11		
									12		
									13		
									14		
									15		
									16		
									17		
									18		
									19		
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									96		
									97		
									98		
									99		
									100		

Big Trench

121

# James & Moore

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13704-131

CAM-OR

11.11.11

DRILLING METHOD: CEC Probe

BORING NO.

DM 19

SAMPLING METHOD: Accurate Core

SHEET

1 OF 1

DRILLING

WATER LEVEL

11

START

FINISH

TIME

0920

TIME

0925

DATE

7/11/96

DATE

7/11/96

CASING DEPTH

DATUM

ELEVATION

SURFACE CONDITIONS: Tall grass/woods

SAMPLER TYPE	INCHES DOWN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48	44	1	1	3.6			0	sm
								1	
								2	
								3	
AL	48	18	2	2	6.5			4	sm
								5	
								6	
								7	
AL	48	24	3	3	7.8			8	sm
								9	
								0	
								1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	
								0	

yellow-brown to olive gray silty sand

Olive gray to tan/buff blackened medium silty sand

Groundwater at 11'

Boring terminated

122

NO. 2041

DATE 7-11-96

5.1 (3) (REV. 11-88)



LOCATION OF BORING

**JOB NO**

**CLIENT**

[illegible]

13704-C31

CAN-CK

LOCATION  
Winchilla, T

DRILLING METHOD: GeoPeb.

BORING NO

DM20

SHEET

/ OF /

SAMPLING METHOD: A.C. L.L. Line

## DRILLING

**START**

## FINISH

WATER LEVEL

TIME

TIME

TIME

10530

1250

DATE \_\_\_\_\_

**DATE** 1/2/81

DATE \_\_\_\_\_

**CASING DEPTH**

1116

11/5/

4

A handwritten table of numbers from 1 to 16 arranged in a 4x4 grid. The number 20 is circled in the top right corner. The table is as follows:

1	10	11	20
2	9	12	19
3	8	13	18
4	7	14	17
5	6	15	16

Below the table, the text "GATE" is written.

**DATUM**

**ELEVATION**

**SURFACE CONDITIONS:**

Tall grass/wind

SAMPLER TYPE	INCHES DOWN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF THINGS	DEPTH IN FEET	SOIL GRAPH
AL	48 18		1 C-4		4.1 ir	0	sm
						1	
						2	
						3	
AL	48 18		2 C-8		73.8	4	sm/sp
						5	
						6	
						7	
AL	48 24		3 C-12		176	8	sm/bp
						9	
						10	
						11	
AL	48 18		4 C-16		229	12	sm/sp
						13	
						14	
						15	
						16	
						17	
						18	
						19	
						20	

SURFACE CONDITIONS: Tall grass/wind

Yellow brown to brown silty sand - organic

Olive gray to tan/buff medium s. ly sand Black sand

Core terminated at 16'

123

123

10. 20-74

19/11/21

1. 2001

# DAMES & MOORE

LOCATION OF BORING

JOB NO.

13704-031

CLIENT

CAM-CL

LOCATION

W. L. W. E.

DRILLING METHOD:

GeoProbe

BORING NO.

DM21

SHEET

1 OF 1

SAMPLING METHOD:

Acute Line

DRILLING

START

FINISH

TIME

TIME

0955

1030

WATER LEVEL

TIME

DATE

CASING DEPTH

DATE

DATE

7/11/96

7/11/96

DATUM

ELEVATION

SURFACE CONDITIONS:

Grass

SAMPLER TYPE	INCHES RECOVERED	INCHES DRIVEN	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	4.5	4.5		1	4.9		0	SM
							1	
							2	
							3	
AL	4.5	2.4		2	14.9		4	SM
							5	
							6	
							7	
AL	4.5	6		3	6.5		8	
							9	SM
							0	
							1	
AL	4.5	1.8		4	0		2	SM
							3	
							4	
							5	
							6	
							7	
							8	
							9	
							0	

Yellow brown to brown silty sand w/ organics

Yellow brown silty sand w/ gravel  
Olive gray

\* Hit rock & have red soil more or less over 6" and start  
over  
Yellow brown/olive gray silty sand

Termination being at 16'

124

NO. 4-20-70

CHK'D BY

DATE 7-11-96

DATE

DATE

110. 2 2 0 4 4 ( WILLING CONT. 1" 25

U.S. GOVERNMENT PRINTING OFFICE: 1969 O - 344-114



LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13701-031

CAROL

Wash. D.C.

DRILLING METHOD:

Hand Drive

BORING NO.

D-24

SAMPLING METHOD:

Rock Line

SHEET

1 OF 1

ORILLING

START

FINISH

WATER LEVEL

TIME

DATE

CASING DEPTH

TIME

1245

DATE

2/11/96

TIME

1305

DATE

2/11/96

DATUM

ELEVATION

SURFACE CONDITIONS:

Grass

SAMPLER TYPE	INCHES DOWN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48 36		1 0-4	9.4	11	0	CL
						1	
						2	
						3	
AL	48 24		2 4-6	9.5	11	4	SM
						5	
						6	
						7	
AL	48 24		3 6-12	9.5	11	8	SM
						9	
						10	
						11	
AL	48 12		4 12-16	8.6	11	2	SM
						3	
						4	
						5	
						6	
						7	
						8	
						9	
						10	

Light brown / dark brown silty sand loam

Changing to dark brown silty sand

Being terminated

NO. 20-70

DATE 7/11/96

5.1.2 (REV. 11-89)

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13204-131

PAV-CL

6.2.11. J

DRILLING METHOD: C-10 P-10

BORING NO.

DM 25

SAMPLING METHOD: Acc. L. L.

SHEET

1 OF 1

DRILLING

START

FINISH

WATER LEVEL

TIME

TIME

TIME

1310

1335

DATE

DATE

DATE

CASING DEPTH

7/11/96

7/11/96

DATUM

ELEVATION

SURFACE CONDITIONS:

Trace

SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	SAMPLE DEPTH	BLOWS/FT. SAMPLER	NO. OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48	36		1	0-4		4136	0	SM
								1	
								2	
								3	
AL	48	24		2	4-8		116	4	SM/SL
								5	
								6	
								7	
AL	48	36		3	8-12		125	8	SM/SL
								9	
								10	
								11	
AL	48	24		4	12-16			12	SM/SL
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

2. 1/2 to 3/4 inch silty sand fines

Changing to fine silty sand blackened

\* Acc. L. L. sampled and broken no sample collected as PID reading taken

Boring terminated

128

UNILING CO. 1/11/96

NO. 2041

CHK'D BY

DATE 7-11-96

SALES DEPT. 11-96



LOCATION OF BORING		JOB NO.	CLIENT	LOCATION
<div style="border: 1px solid black; border-radius: 50%; padding: 5px; display: inline-block;">           Clarified         </div>		1324-131	ATM-CR	West H. E.
DATUM 21 23 22 21		DRILLING METHOD: Free Fall	BORING NO. DM22	SHEET 1 OF 1
ELEVATION 21 22 21		SAMPLING METHOD: A.L.L. Line	START TIME 1435	FINISH TIME 1450
SURFACE CONDITIONS: Grass / Ground		WATER LEVEL	DATE 2/11/01	DATE 2/11/01
CASING DEPTH		TIME		

SAMPLER TYPE	INCHES DRIVER	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AC	48	48	1	1	12.4	1	1	0	SW
AC	48	48	2	2	22.2	2	2	1	SW
AC	48	48	3	3	3	3	3	2	SW
AC	48	48	4	4	4	4	4	3	SW
AC	48	48	5	5	5	5	5	4	SW
AC	48	48	6	6	6	6	6	5	SW
AC	48	48	7	7	7	7	7	6	SW
AC	48	48	8	8	8	8	8	7	SW
AC	48	48	9	9	9	9	9	8	SW
AC	48	48	10	10	10	10	10	9	SW
AC	48	48	11	11	11	11	11	10	SW
AC	48	48	12	12	12	12	12	11	SW
AC	48	48	13	13	13	13	13	12	SW
AC	48	48	14	14	14	14	14	13	SW
AC	48	48	15	15	15	15	15	14	SW
AC	48	48	16	16	16	16	16	15	SW
AC	48	48	17	17	17	17	17	16	SW
AC	48	48	18	18	18	18	18	17	SW
AC	48	48	19	19	19	19	19	18	SW
AC	48	48	20	20	20	20	20	19	SW
AC	48	48	21	21	21	21	21	20	SW
AC	48	48	22	22	22	22	22	21	SW
AC	48	48	23	23	23	23	23	22	SW
AC	48	48	24	24	24	24	24	23	SW
AC	48	48	25	25	25	25	25	24	SW
AC	48	48	26	26	26	26	26	25	SW
AC	48	48	27	27	27	27	27	26	SW
AC	48	48	28	28	28	28	28	27	SW
AC	48	48	29	29	29	29	29	28	SW
AC	48	48	30	30	30	30	30	29	SW
AC	48	48	31	31	31	31	31	30	SW
AC	48	48	32	32	32	32	32	31	SW
AC	48	48	33	33	33	33	33	32	SW
AC	48	48	34	34	34	34	34	33	SW
AC	48	48	35	35	35	35	35	34	SW
AC	48	48	36	36	36	36	36	35	SW
AC	48	48	37	37	37	37	37	36	SW
AC	48	48	38	38	38	38	38	37	SW
AC	48	48	39	39	39	39	39	38	SW
AC	48	48	40	40	40	40	40	39	SW
AC	48	48	41	41	41	41	41	40	SW
AC	48	48	42	42	42	42	42	41	SW
AC	48								





# James & Moore

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13764-031

CAM-OK

W. H. H. J.

DRILLING METHOD: *Crop Hole*

BORING NO.

DM29

SHEET

1 OF 1

SAMPLING METHOD: *Acuteh Core*

DRILLING

WATER LEVEL

TIME

DATE

CASING DEPTH

START

TIME

1525

FINISH

TIME

1535

DATE

7/11/96

DATE

7/11/96

DATUM

ELEVATION

SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48	42		1	6.4	12.5	0	SM
							1	
							2	
							3	
AL	48	36		2	4.8		4	SM
							5	
							6	
							7	
							8	▽
							9	
							0	
							1	
							2	
							3	
							4	
							5	
							6	
							7	
							8	
							9	
							0	

SURFACE CONDITIONS:

*Grass*

*Yellowish-brown to dark brown silty sandstone*

*Bois terminated at groundwater*

*& (possibly) may be testing*

132

NO. 2001

CHK'D BY

DATE

7-11/96

DATE

7-11/96

DATE

7-11/96

DATE

7-11/96

LOCATION OF BORING

(1.6.1.1)

30 29 28 27

Building  
Timber

24 25 26

JOB NO.

1324-C31

CLIENT

CAMCO

LOCATION

1.6.1.1.1

DRILLING METHOD: G.P.S.

BORING NO.

DM30

SHEET

1 OF 1

SAMPLING METHOD: A.L.L.I.

DRILLING

WATER LEVEL

TIME

DATE

CASING DEPTH

START

TIME

DATE

7/1/66

FINISH

TIME

DATE

7/1/66

DATUM

ELEVATION

SURFACE CONDITIONS: G-nes

SAMPLER TYPE	INCHES DOWN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL 48	24		1 0-7		10.0	0	SM
						1	
						2	
						3	
AL 48	36		2 4-8		9.2	4	SM
						5	
						6	
						7	
AL 48	24		3 6-12		8.5	8	SM
						9	
						10	
						11	
AL 48	24		4 12-16		10.0	12	SM
						13	
						14	
						15	
						16	
						17	
						18	
						19	
						20	

Light brown to dark brown to yellow-brown silty sand

Being terminated

-133

No. 202004

DATE 7-11-76

CHKD BY



# DAMES & MOORE

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13704-C31

CALMIL

Wentworth, IL

DRILLING METHOD: *Acrop. L.*

BORING NO.

DM 32

SAMPLING METHOD: *Acrop. L.*

SHEET

1 OF 1

DRILLING

START

FINISH

WATER LEVEL

TIME

TIME

TIME

0825

0840

DATE

DATE

7/12/96

7/12/96

CASING DEPTH

DATUM

ELEVATION

SURFACE CONDITIONS: *Grass*

SAMPLER TYPE	INCHES RECOVERED	INCHES DRIVEN	DEPTH OF CASING	SAMPLE NO.	SAMPLE DEPTH	BLOWS/FT. SAMPLER	IBID NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AC	42	42		1	6-4		45.5	0	SM
								1	
								2	
								3	
AL	48	36		2	4-8		45.4	4	SM
								5	
								6	
								7	
AL	48	24		3	6-12		50.0	8	SM/SP
								9	
								10	
								11	
								12	
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Yellow brown to brown silty sand with r. grains

Yellow brown to dark brown silty sand blacked

IBID with some sand seams

Boring terminated due to refusal

135

NO. L-2000

DATE 7-12-96 CHK'D BY



# James & Moore

LOCATION OF BORING		JOB NO. 13704-031		CLIENT CMMCR		LOCATION Westville, Ia	
		DRILLING METHOD: Air Core				BORING NO. DM34	
		SAMPLING METHOD: Air Core				SHEET 1 of 1	
		WATER LEVEL				START TIME 0915	
		TIME				FINISH TIME 0930	
		DATE				DATE 7/12/96	
		CASING DEPTH				DATE 7/12/96	

SAMPLER TYPE	INCHES		DEPTH OF CASING	SAMPLE NO.		BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
	DRIVEN	RECOVERED		DEPTH	NO.				
AL	48	28		1	0-4		234	0	SM
								1	
								2	
								3	
								4	SM
AL	48	21		2	4-8		357	5	
								6	
								7	
								8	SM
AL	48	24		3	8-12		160	9	
								0	
								1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	
								0	
								1	
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								5	
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								8	
								9	
								0	
								1	
								2	
								3	
								4	

# Dames & Moore

LOCATION OF BORING 34 35		JOB NO. 13204-031	CLIENT CARMOR	LOCATION W.L.I.I.
DRILLING METHOD: <i>Geo. P. Co.</i>			BORING NO. Dm 35	
SAMPLING METHOD: <i>Hand Auger</i>			SHEET 1 OF 1	
WATER LEVEL			START TIME	
TIME			FINISH TIME	
DATE			DATE	
CASING DEPTH			DRILLING	
			7/12/96 7/12/96	

DATUM	ELEVATION	SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD	NUMBER OF "RINGS"	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS: <i>Grass</i>
		AL	48	24		1	6.4			11.0	0	sm	Yellow-brown to brown silty sand (in organic)
											1		
											2		
											3		
		AL	48	24		2	4.8			11.2	4	sm	Olive-gray to yellow-brown silty sand
											5		
											6		
											7		
		AL	48	32		3	8.12			29.6	8	sm SP?	Blackened silty sand
											9		
											10		
											11		
											12		Bar terminated Drill refusal
											13		
											14		
											15		
											16		
											17		
											18		
											19		
											20		

138

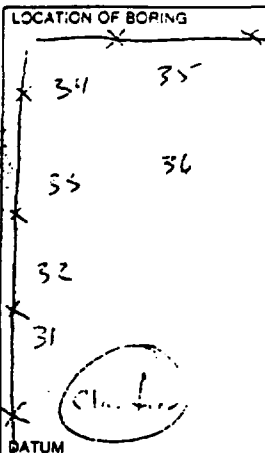
NO. 1 - 100

DATE 7-12-96

DATE 7-12-96



# Dames & Moore



JOB NO. 1574-231		CLIENT CAMER		LOCATION W. L. H. In	
DRILLING METHOD: <i>Geoprobe</i>				BORING NO. DM 36	
SAMPLING METHOD: <i>Acute Line</i>				SHEET 1 of 1	
WATER LEVEL				START	FINISH
TIME				TIME	TIME
DATE				DATE	DATE
CASING DEPTH				7/12/96	7/12/96

DATUM ELEVATION

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
AL	48/48		1 5.1	5.2	0	SM	Changing to yellow brown to dark brown black sand silt/sand
					1		
					2		
					3		
AL	48/48		2 4.8	240	4	SM	
					5		
					6		
					7		
					8		Boring terminated - drilling refusal
					9		
					10		
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

139

10.2-2000

DATE 7-12-96 CHK'D BY

1.1 (REV. 11-89)



# James & Moore

LOCATION OF BORING

31 35  
33 36  
32 34  
31 35  
Clarified

JOB NO.

13204-051

CLIENT

CAW CR

LOCATION

W. L. H. I

DRILLING METHOD: Geo Probe

BORING NO.

DM38

SHEET

1 OF 1

SAMPLING METHOD: A. L. L. L.

DRILLING

WATER LEVEL

TIME

DATE

CASING DEPTH

START

TIME

1140

FINISH

TIME

1150

DATE

7/12/66

DATE

7/12/66

DATUM

ELEVATION

SURFACE CONDITIONS: Grass

SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48	15		1	10.4	5.8	0	Sum
							1	
							2	
							3	
AL	48	12		2	4.8	16.4	4	Sum SI?
							5	
							6	
							7	
							8	
							9	
							10	
							11	
							12	
							13	
							14	
							15	
							16	
							17	
							18	
							19	
							20	

Clayey up to yellow brown to dark brown blacked silty sand

Being terminated drilling refusal

141

DRILLING CONTRACT

NO. 2000

DATE 7-12-66 CHK'D BY

SLI (S. 11-66)

# James & Moore

LOCATION OF BORING

JOB NO.

13704-031

CLIENT

CAM-CK

LOCATION

U.S. 11. J.

DRILLING METHOD:

Geoprobe

BORING NO.

DM39

SHEET

1 OF 1

SAMPLING METHOD:

Acute

DRILLING

START

FINISH

WATER LEVEL

TIME

DATE

CASING DEPTH

TIME

1230 1235

DATE

7/12/94 7/12/94

DATUM

ELEVATION

SURFACE CONDITIONS:

Gravel

SAMPLER TYPE	INCHES OPEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	BLOWS/FT. SAMPLER	NUMBER OF RINGS
AL	48	48	0.4	1	16.3	
AL	48	0	4.8	2		

DEPTH IN FEET

SOIL GRAPH

Changing to yellowish to dark brown silty sand

Bottom 6" are blackened

No sample recovery  
Liner is clogged

Being terminated - drilling

142

NO. 2000

CHK'D BY

DATE 7-12-94

PL 100 (REV. 11-89)

# Dames & Moore

LOCATION OF BORING		JOB NO. 13704-031	CLIENT CAM-CL	LOCATION Wichita, KS
51 33 36 34 37 40 31 32 39 (Cl. f...)		DRILLING METHOD: <i>Hand</i> SAMPLING METHOD: <i>Alcohol Line</i>		BORING NO. DM40 SHEET 1 OF 1 DRILLING START TIME 1240 FINISH TIME 1242 DATE 7/12/96 DATE 7/12/96
DATUM ELEVATION		WATER LEVEL TIME DATE CASING DEPTH		

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	FI NUMBER OF THINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS: <i>Grass</i>
AL	48 36		1 0-4		12.2	0		Changing to yellow brown to dark brown silty sand
						1		
						2		
						3		Last 12" are blackened
						4		Tip of sampler very wet
						5		
						6		
						7		
						8		
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

143

NO. 202004

DATE 7-12-96 CHK'D BY

LOCATION OF BORING

JOB NO

CLIENT

LOCATION

15704-231

CIAM-CK

West Hill, E

DRILLING METHOD: *Core Drill*

BORING NO.

DM41

SHEET

1 of 1

SAMPLING METHOD: *Hand Lined*

DRILLING

WATER LEVEL

START

FINISH

TIME

TIME

TIME

DATE

1245

1255

DATE

DATE

CASING DEPTH

7/12/96

7/12/96

DATUM

ELEVATION

SAMPLER TYPE	INCHES DRIVE INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48/48		1 0-4		5.0	0	SM
						1	
						2	
						3	
AL	48/36		2 0-8		47.9	4	SM
						5	
						6	
						7	
						8	
						9	
						0	
						1	
						2	
						3	
						4	
						5	
						6	
						7	
						8	
						9	
						0	

SURFACE CONDITIONS:

*Grass*

*Drilling to dark brown silty sand*

*Blackened soil*

*Bright colored H<sub>2</sub>O encountered*

144

NO 203951

DATE 7-12-96 CHK'D BY

## LOCATION OF BORING

LOCATION OF BORING		
31	35	42
33	36	41
31	32	40
31	38	39

(Ch. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811

**ELEVATION**

1711

SAMPLER TYPE		INCHES DRIVEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	40/42			1	01		7.3	2	0	AL
AL	40/42			2		4.5	7.9		1	AL
AL	40/42			3					2	
AL	40/42			4					3	
AL	40/42			5					4	
AL	40/42			6					5	
AL	40/42			7					6	
AL	40/42			8					7	
AL	40/42			9					8	
AL	40/42			10					9	
AL	40/42			11					10	
AL	40/42			12					11	
AL	40/42			13					12	
AL	40/42			14					13	
AL	40/42			15					14	
AL	40/42			16					15	
AL	40/42			17					16	
AL	40/42			18					17	
AL	40/42			19					18	
AL	40/42			20					19	
AL	40/42			21					20	
AL	40/42			22					21	
AL	40/42			23					22	
AL	40/42			24					23	
AL	40/42			25					24	
AL	40/42			26					25	
AL	40/42			27					26	
AL	40/42			28					27	
AL	40/42			29					28	
AL	40/42			30					29	
AL	40/42			31					30	
AL	40/42			32					31	
AL	40/42			33					32	
AL	40/42			34					33	
AL	40/42			35					34	
AL	40/42			36					35	
AL	40/42			37					36	
AL	40/42			38					37	
AL	40/42			39					38	
AL	40/42			40					39	
AL	40/42			41					40	
AL	40/42			42					41	
AL	40/42			43					42	
AL	40/42			44					43	
AL	40/42			45					44	
AL	40/42			46					45	
AL	40/42			47					46	
AL	40/42			48					47	
AL	40/42			49					48	
AL	40/42			50					49	
AL	40/42			51					50	
AL	40/42			52					51	
AL	40/42			53					52	
AL	40/42			54					53	
AL	40/42			55					54	
AL	40/42			56					55	
AL	40/42			57					56	
AL	40/42			58					57	
AL	40/42			59					58	
AL	40/42			60					59	
AL	40/42			61					60	
AL	40/42			62					61	
AL	40/42			63					62	
AL	40/42			64					63	
AL	40/42			65					64	
AL	40/42			66					65	
AL	40/42			67					66	
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AL	40/42			70					69	
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AL	40/42			72					71	
AL	40/42			73					72	
AL	40/42			74					73	
AL	40/42			75					74	
AL	40/42			76					75	
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AL	40/42			78					77	
AL	40/42			79					78	
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AL	40/42			81					80	
AL	40/42			82					81	
AL	40/42			83					82	
AL	40/42			84					83	
AL	40/42			85					84	
AL	40/42			86					85	
AL	40/42			87					86	
AL	40/42			88					87	
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AL	40/42			91					90	
AL	40/42			92					91	
AL	40/42			93					92	
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AL	40/42			95					94	
AL	40/42			96					95	
AL	40/42			97					96	
AL	40/42			98					97	
AL	40/42			99					98	
AL	40/42			100					99	
AL	40/42			101					100	
AL	40/42			102					101	
AL	40/42			103					102	
AL	40/42			104					103	
AL	40/42			105					104	
AL	40/42			106					105	
AL	40/42			107					106	
AL	40/42			108					107	
AL	40/42			109					108	
AL	40/42			110					109	
AL	40/42			111					110	
AL	40/42			112					111	
AL	40/42			113					112	
AL	40/42			114					113	
AL	40/42			115					114	
AL	40/42			116					115	
AL	40/42			117					116	
AL	40/42			118					117	
AL	40/42			119					118	
AL	40/42			120					119	
AL	40/42			121					120	
AL	40/42			122					121	
AL	40/42			123					122	
AL	40/42			124					123	
AL	40/42			125					124	
AL	40/42			126					125	
AL	40/42			127					126	
AL	40/42			128					127	
AL	40/42			129					128	
AL	40/42			130					129	
AL	40/42			131					130	
AL	40/42			132					131	
AL	40/42			133					132	
AL	40/42			134					133	
AL	40/42			135					134	
AL	40/42			136					135	
AL	40/42			137					136	
AL	40/42			138					137	
AL	40/42			139					138	
AL	40/42			140					139	
AL	40/42			141					140	
AL	40/42			142					141	
AL	40/42			143					142	
AL	40/42			144					143	
AL	40/42			145					144	
AL	40/42			146					145	
AL	40/42			147					146	
AL	40/42			148					147	
AL	40/42			149					148	
AL	40/42			150					149	
AL	40/42			151					150	
AL	40/42			152					151	
AL	40/42			153					152	
AL	40/42			154					153	
AL	40/42			155					154	
AL	40/42			156					155	
AL	40/42			157					156	
AL	40/42			158					157	
AL	40/42			159					158	
AL	40/42			160					159	
AL	40/42			161					160	
AL	40/42			162					161	
AL	40/42			163					162	
AL	40/42			164					163	
AL	40/42			165					164	
AL	40/42			166					165	
AL	40/42			167					166	
AL	40/42			168					167	
AL	40/42			169					168	
AL	40/42			170					169	
AL	40/42			171					170	
AL	40/42			172					171	
AL	40/42			173					172	
AL	40/42			174					173	
AL	40/42			175					174	
AL	40/42			176					175	
AL	40/42			177					176	
AL	40/42			178					177	
AL	40/42			179					178	
AL	40/42			180					179	
AL	40/42			181					180	
AL	40/42			182					181	
AL	40/42			183					182	
AL	40/42			184					183	
AL	40/42			185					184	
AL	40/42			186					185	
AL	40/42			187					186	
AL	40/42			188					187	
AL	40/42			189					188	
AL	40/42			190					189	
AL	40/42			191					190	
AL	40/42			192					191	
AL	40/42			193					192	
AL	40/42			194					193	
AL	40/42			195					194	

NO. 09550

DATE 7-12-96

158.1 (3) (REV. 5-1-86)

LOCATION OF BORING				JOB NO 13704-031		CLIENT CAM-08		LOCATION W. L. H. T.	
<div style="display: flex; justify-content: space-around;"> <span>34    35    42</span> <span>43</span> </div> <div style="display: flex; justify-content: space-around;"> <span>33    36    41</span> </div> <div style="display: flex; justify-content: space-around;"> <span>32    37    40</span> </div> <div style="display: flex; justify-content: space-around;"> <span>31    38    39</span> </div> <div style="margin-top: 10px;"> <span style="border: 1px solid black; border-radius: 50%; padding: 5px;">Classification</span> </div>				DRILLING METHOD: <u>GeoProbe</u>				BORING NO. DM43	
				SAMPLING METHOD: <u>Al. L. L. L.</u>				SHEET 1 of 1	
				<div style="display: flex; justify-content: space-between;"> <div> WATER LEVEL TIME DATE CASING DEPTH </div> <div style="border: 1px solid black; width: 100%; height: 100%;"></div> </div>				DRILLING START TIME DATE FINISH TIME DATE	
DATUM		ELEVATION		SURFACE CONDITIONS: <u>Grass</u>					
SAMPLER TYPE	INCHES DRIVEN / INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. / SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD / NUMBER OF THINGS	DEPTH IN FEET	SOIL GRAPH		
AL	48 / 48		1 / 0-4		7.6	0	CL	Yellowish-grey to black loam s.l.y. sandy clay	
						1			
						2			
						3			
AL	48 / 36		2 / 4-8		82.6	4	CL		
						5			
						6			
						7			
						8		Black and wet at 8'	
						9			
						0		Boring terminated due to refusal	
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						0			
								146	



# DAMES & MOORE

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13704-031

CAMP CIL

Washville TN

DRILLING METHOD: Geo. D. L.

BORING NO.

DM44

SAMPLING METHOD: A. L. L. C. L.

SHEET

1 of 1

DRILLING

WATER LEVEL

TIME

DATE

CASING DEPTH

START

TIME

1335

FINISH

TIME

1345

DATE

7/12/96

DATE

7/12/96

DATUM

ELEVATION

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	44 42		1 1-4	72	0	CL
					1	
					2	
					3	
AL	48 36		2 1-8	508	4	
					5	
					6	
					7	
					8	
					9	
					0	
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					9	
					0	

SURFACE CONDITIONS:

Grass

Yellowish-brown to dark brown to olive green, silty sandy clay

IRID Black sand wet

Bring to surface Drilling fluid/H<sub>2</sub>O

147

DRILLING LOG

NO. 0096

DATE 7-12-96 CHK'D BY

128-1 (3) (REV. 11-4)

# DAMES & MOORE

LOCATION OF BORING <div style="text-align: center; font-size: 2em;">N ↑</div>		JOB NO. 13704-031	CLIENT CAM-CL	LOCATION WILLET
<div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;">34</div> <div style="width: 33%;">35</div> <div style="width: 33%;">42</div> <div style="width: 33%;">43</div> <div style="width: 33%;">33</div> <div style="width: 33%;">36</div> <div style="width: 33%;">41</div> <div style="width: 33%;">44</div> <div style="width: 33%;">32</div> <div style="width: 33%;">37</div> <div style="width: 33%;">40</div> <div style="width: 33%;">45</div> <div style="width: 33%;">31</div> <div style="width: 33%;">38</div> <div style="width: 33%;">39</div> </div> <div style="border: 1px solid black; border-radius: 50%; width: 100px; height: 40px; margin: 10px auto; text-align: center; line-height: 40px;">Clarifier</div>		DRILLING METHOD: <i>Auger</i>		BORING NO. DM45
		SAMPLING METHOD: <i>Automatic Line</i>		SHEET 1 of 1
DATUM		ELEVATION		DRILLING
		WATER LEVEL		START TIME
		TIME		1350
		DATE		7/12/61
		CASING DEPTH		FINISH TIME 1400
				DATE 7/12/61

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF TINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS: <i>Grass</i>	
AL	45/45		1/0-4		24	0	CL	<i>Yellow brown to dark brown to silty sandy clay</i>	
						1			
						2			
						3			
AL	45/36		2/4-8		400	4	CL	<i>Blackened + w. L</i>	
						5			
						6			
						7			
						8		<i>Boring terminated due to refusal/rocky bottom</i>	
						9			
						0			
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						0			

148

DRILLING CONTR.

NO20396

DATE 7-12-61 CHK'D BY

128-1 (3) (REV. 11-60)

1

LOCATION OF BORING

JOB NO.

CLIENT

LOCATION

13704-031

CAM-OK

11/11/96

DRILLING METHOD:

Geo-Pole

BORING NO.

DM47

SAMPLING METHOD:

Available Lines

SHEET

1 of 1

DRILLING

START

FINISH

WATER LEVEL

TIME

DATE

CASING DEPTH

TIME

0815 0830

DATE

7/16/96 7/16/96

DATUM

SL2

ELEVATION

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PRO NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH
AL	48 36		1 124		11.2	0	
						1	SM
						2	
						3	
AL	48 24		2 48		5.2	4	SM
						5	
						6	
						7	
AL	48 18		3 6-12		2.7	8	SM
						9	
						10	
						11	
						12	
						3	
						4	
						5	
						6	
						7	
						8	
						9	
						0	

SURFACE CONDITIONS:

Gravel

1 foot of gravel

yellow brown to tan/lt silty sand

Blackened at tip of sampler

Beig terminated H<sub>2</sub>O encountered

150

NO. 2-96

DATE 7-16-96

CHK'D BY

488-1 (3) (REV. 11-8)

FD-302 (REV. 11-6)

5

28.1 (3) REV. 11.00.

152

# DANIELS & MOORE

LOCATION OF BORING				JOB NO.		CLIENT		LOCATION	
<div style="text-align: center;"> </div>				13701-031		CAMOCK		Wichita, KS	
				DRILLING METHOD: <i>Grout</i>		BORING NO.			
				SAMPLING METHOD: <i>Anchor Line</i>		SHEET			
				WATER LEVEL		START			
				TIME		FINISH			
DATE		DATE							
CASING DEPTH		DATE							
DATUM <i>CR 2</i>				ELEVATION		SURFACE CONDITIONS: <i>Grass</i>			
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO.	BLOWS/FT. SAMPLER	DEPTH IN FEET	SOIL GRAPH		
AL	48	36		1	21.0	0	SM	<i>Yellow brown to black brown s. l. clay sand</i>	
						1			
						2			
						3			
AL	48	21		2	5.6	4	SM		
						5			
						6			
						7			
AL	48	36		3	6.8	8	SM		
						9			
						10			
						11			
						12		<i>Black soil in boring Boring terminated at this depth</i>	
						13			
						14			
						15			
						16			
						17			
						18			
						19			
						20			
						21			
						22			
						23			
						24			
						25			
						26			
						27			
						28			
						29			
						30			

NO. 2-96

DATE 7-16-96 CHK'D BY

# James & Moore

LOCATION OF BORING <div style="text-align: center;"> </div>		JOB NO. 13764-021	CLIENT CAM-OK	LOCATION W.L. 11.2
DRILLING METHOD: <i>Geoprobe</i>		BORING NO. DMS1		
SAMPLING METHOD: <i>Acute Line</i>		SHEET 1 of 1		
WATER LEVEL		DRILLING		
TIME		START TIME 0930		
DATE		FINISH TIME 0945		
CASING DEPTH		DATE 7/16/96		

DATUM				ELEVATION				SURFACE CONDITIONS: <i>Grass</i>	
SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH		
AL	45/24		1 0-4		2.8	0	SM	<i>Yellowish sand to tan L. silty sand</i>	
						1			
						2			
						3			
AL	45/36		2 4-8		6.1	4	SM		
						5			
						6			
						7			
						8		<i>Black in last foot</i> <i>H<sub>2</sub>O Ring terminated</i>	
						9			
						0			
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						0			
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						0			

154

102009610  
 DATE 7-16-96  
 328.1 (3) (REV. 11-86)



# JAINES & MOORE

LOCATION OF BORING		JOB NO.	CLIENT	LOCATION
S1 S2		13704-24	CITY HALL	14th & H St.
SO		DRILLING METHOD: 62.1 P.S.		BORING NO.
				DM 52
		SAMPLING METHOD: Air Lift Line		SHEET
				1 of 1
				DRILLING
		WATER LEVEL	START TIME	FINISH TIME
		TIME	0550	1105
		DATE	7/10/41	DATE
		CASING DEPTH		7/10/41

DATION	SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER P.D. NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
	AL	48 24	1	4	210	0	SM	Yellow loam to clayey loam to silty sand
						1		
						2		
						3		
						4	SM	
	AL	48 24	2	4.5	230	5		
						6		
						7		
						8		
	AL	48 24	3	5.12	50.2	9	SM	Black sand
						10		
						11		
						12		
						13		
						14		
						15		
						16		
						17		
						18		
						19		
						20		
						21		
						22		
						23		
						24		
						25		
						26		
						27		
						28		
						29		
						30		
						31		
						32		
						33		
						34		
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						39		
						40		
						41		
						42		
						43		
						44		
						45		
						46		
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						49		
						50		
						51		
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						53		
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						66		
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						69		
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						80		
						81		
						82		
						83		
						84		
						85		
						86		
						87		
						88		
						89		
						90		
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						92		
						93		
						94		
						95		
						96		
						97		
						98		
						99		
						100		

10.  
DATE 7-16-96 CHK'D BY

NO 2-396

DRILLING CONT.

# Dames & Moore

LOCATION OF BORING		JOB NO	CLIENT	LOCATION
51 50 49 48 47 46		13704-034	C. AM. OK	10.1.1.1
		DRILLING METHOD: Geo Probe		BORING NO.
				DM53
		SAMPLING METHOD: Air-Lift Line		SHEET
				1 of 1
				DRILLING
		WATER LEVEL		START
		TIME		TIME
		DATE		DATE
		CASING DEPTH		DATE
				7/16/94

DATUM ELEVATION

SAMPLER TYPE	INCHES DRIVEN INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
AL	48 21		1 6.4			0	SM	Yellow brown to dark brown blackened s.l. & gravel
						1		
						2		
						3		
AL	48 21		2 21.8			4	SM	
						5		
						6		
						7		
AL	48 24		3 5-12			8	SM	
						9		
						10		
						11		
						12		H <sub>2</sub> O Brought in
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		156

NO 20096000  
DATE 7-11-94  
CHK'D BY  
156



NOZ 6815

DATE 7-16-91 CHK'D BY \_\_\_\_\_

# Dames & Moore

LOCATION OF BORING

51 52  
50 53  
49 54 56  
48 55  
47  
46

JOB NO

13204-031

CLIENT

CAMOR

LOCATION

W. 11. 2

DRILLING METHOD

Geopoint

BORING NO.

1056

SHEET

1 of 1

SAMPLING METHOD

Available Line

DRILLING

START

FINISH

WATER LEVEL

TIME

DATE

CASING DEPTH

TIME

1200

DATE

7/10/96

TIME

1215

DATE

7/10/96

DATUM

ELEVATION

SAMPLER TYPE	INCHES DRIVEN RECORDED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	PTD NUMBER OF THINGS	DEPTH IN FEET	SOIL GRAPH
AL	48 48		1 0-11	4.3		0	CL
						1	
						2	
						3	
AL	48 36		2 4-8	29.4		4	SM
						5	
						6	
						7	
AL	48 36		3 5-12	75.7		8	SM
						9	
						10	
						11	
						12	
						13	
						14	
						15	
						16	
						17	
						18	
						19	
						20	

SURFACE CONDITIONS:

D: +

Yellow-brown to olive gray silty sandy clay

Yellow-brown - silty sand

Groundwater encountered being handled

159

NO. 2-91

DATE 7-16-96 CHK'D BY

160

# Dames & Moore

LOCATION OF BORING		JOB NO.	CLIENT	LOCATION
51 52 53 54 55 56 57 58 49 47 46		13704-031	CAM-OK	100.11.2
DRILLING METHOD: <i>Aug. P. S.</i>				BORING NO.
				DM 58
SAMPLING METHOD: <i>A. L. L. L.</i>				SHEET
				1 of 1
				DRILLING
WATER LEVEL				START TIME
				12:10
TIME				FINISH TIME
				12:50
DATE				DATE
				7/10/66
CASING DEPTH				DATE
				7/10/66

DATUM ELEVATION

SAMPLER TYPE	INCHES DRIVER INCHES RECORDED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER P.D. NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:
AL	48/36		1 0-4	2.8	0	SM	Dirt + wood
					1		
					2		
					3		
AL	48/36		2 48	1.3	4	SM	
					5		
					6		
					7		
					8		Groundwater at 81 Being determined
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

161

102-991

DATE 7-16-96

128.1 (3) (REV. 11-80)

DATE 7-16-96 CHK'D BY           

10. 546 NG C 12 12

DATE 7-16-96 CHK'D BY           

10. 546 NG C 12 12



# Dames & Moore

LOCATION OF BORING <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">             50 44 48  47  46           </div> <div style="text-align: center;">             52 53 54 56 57  60 59 58           </div> </div>				JOB NO. 13704-031		CLIENT CAMIK		LOCATION W. L. 1	
				DRILLING METHOD: Gas probe		BORING NO. DM 1.0			
				SAMPLING METHOD: Acute Line		SHEET 1 of 1			
				WATER LEVEL TIME DATE CASING DEPTH		DRILLING START TIME 1335 DATE 7/16/96			
				FINISH TIME 1350 DATE 7/16/96					

DATUM \_\_\_\_\_ ELEVATION \_\_\_\_\_

SAMPLER TYPE	INCHES DRIVER INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. SAMPLE DEPTH	BLOWS/FT. SAMPLER	NUMBER OF RINGS	DEPTH IN FEET	SOIL GRAPH	SURFACE CONDITIONS:	
								DEPT	+
AL	48/36		1 1-4	33.4		0	SM	Dark brown to yellow brown to tan buff silty sand	
						1			
						2			
AL	48/36		2 4-8	34.8		4	SM		
						5			
						6			
AL	48/36		3 7-12	40.2		8	SM		
						9			
						10			
						11		Boring terminated at groundwater	
						12			
						13			
						14			
						15			
						16			
						17			
						18			
						19			
						20		163	
						21			
						22			

NO. 141  
 DATE 7-16-96  
 CHK'D BY  
 88.1 (2) (REV. 11-80)

## **APPENDIX E**

### **DATA VALIDATION**

## DATA VALIDATION

### Fingerprint Samples

Soil/NAPL samples were submitted to Friedman and Bruya of Seattle, Washington from two locations where petroleum products were found. The NAPL samples were fingerprinted for comparative purposes. The laboratory specializes in GC/MS techniques that allow for the identification of chemical constituents typically found in fuels, lubricants or other compounds.

### Analytical Data QA/QC Evaluation

A quality assurance/quality control (QA/QC) review was performed on the organic analytical data associated with the CAM-OR site to assess the quality and usability of the data. The QA/QC review evaluated holding times, initial and continuing instrument calibrations, blank analyses (laboratory, equipment/rinsate, and trip), surrogate analyses, matrix spike/matrix spike duplicate (MS/MSD) analyses, laboratory control sample/laboratory control sample (LCS/LCSD) analyses and duplicate analyses (laboratory and field), where available. The evaluation was based upon the *National Functional Guidelines for Organic Data Review* (US EPA, February, 1994) modified to include specific criteria of the individual analytical methods utilized for the CAM-OR project.

### January 1996 Sampling Event

Investigative groundwater samples were analyzed by Savannah Laboratories of Savannah, Georgia as follows:

- 26 samples for volatile organic compounds (VOCs) by U.S. EPA SW-846 Method 8240; and,
- 22 samples for semivolatile organic compounds (SVOCs) by U.S. EPA SW- 846 Method 8270.

Technical holding times were assessed by comparing the sampling dates with that of the preparation (extraction) dates and/or the analysis dates. The technical holding time requirements were met for all sample analyses.

QC limits for initial and continuing instrument calibration were established to ensure that the instrument was capable of producing accurate quantitative data at the beginning and throughout each of the analyses. No initial or continuing calibration verification (ICV/CCV) data were provided with the CAM-OR project sample delivery groups (SDGs).

Trip blanks (TBs) are carbon-free deionized water samples that accompany the investigative VOC samples during all stages of shipment, storage and analysis. Trip blanks are used to evaluate the potential for artificial introduction of VOCs into the investigative samples during the transportation

and sample handling processes. Four trip blanks were reported; one with each of the four sampling day SDGs. No chemical constituents were reported in any of the trip blanks.

Equipment (rinsate) blanks are samples collected by pouring carbon-free deionized water over and/or through sample collection devices following the associated sampling apparatus decontamination procedures. Equipment blanks were used to evaluate the effectiveness of decontamination procedures to determine if sampling cross-contamination could have occurred. Two equipment blanks were collected and submitted for VOC and SVOC analyses. No chemical constituents were detected in the SVOC equipment blanks. VOC Equipment Blank #1 and Equipment Blank #2 reported trichloroethene (TCE) at concentrations of 1,600 µg/l and 480 µg/l, respectively.

Since TCE is not a common laboratory chemical constituent and the levels reported in the equipment blanks were high, Dames & Moore made additional efforts to pinpoint the possible source(s). The three potential sources/causes of equipment blank contamination included: cross-contamination during the analytical procedures; contaminated water used in the decontamination procedures; and, cross-contamination during the sample collection procedures.

Dames & Moore obtained the applicable laboratory analytical run logs to investigate the potential for instrument carry-over from previous samples. It was apparent from the run logs that instrument carry-over was not the source of equipment blank contamination. Further investigation of the analytical run logs by Dames & Moore revealed that the first analysis of Equipment Blank #1 reported a concentration of TCE which exceeded the instrument calibration range (2,000 µg/l), therefore, the second vial of Equipment Blank #1 was analyzed by a different analyst on a different GC/MS instrument. The results of the second analysis reported a TCE concentration of 1,600 µg/l. The consistent TCE results obtained in the two separate analyses of Equipment Blank #1 seem to indicate that there is minimal potential for a random analytical error to be the cause of the equipment blank contamination.

To investigate the potential that contaminated water may have been used in the decontamination procedures, Dames & Moore obtained samples of the water and submitted the samples to Savannah Laboratories for analysis. The analytical results reported no contamination in the water used for equipment decontamination (see Attachment 1).

Barring any random sample mishandling, the most plausible explanation remaining was the cross-contamination of samples during the sample collection procedures. Dames & Moore reviewed the sample collection sequence (see Table 1) to investigate this scenario. Based upon this evaluation, Dames & Moore could not rule out the potential for sampling cross-contamination. However, it remains unclear how the samples which preceded Equipment Blank #1, reporting TCE concentrations ranging from 600 µg/l to 270 µg/l (sample MW-2S immediately preceding Equipment Blank #1), could have contributed a TCE concentration of 1,600 µg/l to Equipment Blank #1.

Following Dames & Moore's investigation of the TCE equipment blank contamination, Keck Instruments, the supplier of the pump used to develop and sample the CAM-OR wells, informed Dames & Moore that they had sampled the pump and hose used on the CAM-OR project prior to and

following the CAM-OR field work. Keck Instruments supplied a copy of the Environmental Science & Engineering (ES&E) laboratory analytical data report to Dames & Moore (see Attachment 2). Prior to the CAM-OR field work, the sample data associated with the pump and hose reported no contamination. Following the CAM-OR field work, however, the sample data associated with the pump reported 40 µg/l of TCE while the sample data associated with the pump and hose reported a TCE concentration of 151 µg/l. This appears to be the result of TCE adsorbing strongly to the pump station which was lined with Viton®. This material is a black supple rubber product that surrounds the libriel impeller in the submersible pump.

From the investigation of the equipment blank contamination problem, Dames & Moore has concluded that the decontamination procedures utilized on the pump and hose were not sufficient to effectively decontaminate this particular pump and hose given the type of chemical constituents present at the CAM-OR site. Since Dames & Moore cannot evaluate the exact quantity of TCE that could have been transferred from sample to sample, all of the TCE data have been qualified "B" (detected in blank) following the first well in which TCE was encountered (MW-5D). The samples qualified "B" include MW-5S, MW-5S Dup, MW-6D, MW-6S, MW-2D, MW-2S, Equipment Blank #1, MW-3D, MW-3S, MW-1D, MW-1S, Equipment Blank #2, B-2 and B-22 Dup.

Laboratory method blanks are blank air, water or soil samples prepared by the analytical laboratory and analyzed in the same fashion as the investigative samples. Water and soil laboratory method blanks were used to ensure that the investigative samples were not contaminated during the sample preparation, sample analysis or from a previous sample (instrument carry-over). All water laboratory method blanks were reported free of contamination.

Surrogate compounds are those compounds which are not expected to be detected in the investigative samples but which are chemically similar to analytes of interest. Surrogate compound percent recoveries (%Recs) were used to evaluate extraction efficiencies, possible matrix effects and overall analytical accuracy. Surrogate compound %Recs were reported with the VOC and SVOC analyses. All VOC and SVOC sample surrogate compound %Recs were reported within QC limits with the exception of sample MW-2D (2,4,6-tribromophenol = 35%; QC limits = 41 - 143%). SVOC sample data are qualified based on surrogates only when two surrogates are recovered outside the corresponding QC limits per analytical fraction (i.e., acid or base/neutral).

Matrix spikes are samples fortified (spiked) with known concentrations of analytes of interest. The %Recs of matrix spikes (MS) and matrix spike duplicates (MSD) were used to evaluate extraction efficiencies, possible matrix effects, overall analytical accuracy and analytical precision. All reported VOC and SVOC MS/MSD percent recoveries and relative percent differences (RPDs) were within QC advisory limits with the exception of the following VOC MSD compound %Rec:

Batch #	Sample	MS/MSD Analyte	%Rec	QC Limits
80400-11	MW-6S MSD	Trichloroethene (TCE)	56%	64 - 131%

Analytical data were qualified on the basis of MS/MSD %Recs alone.

Laboratory control samples (LCSs) and their duplicates (LCSDs), also known as blank or reagent spikes, are blank samples spiked with known concentrations of analytes of interest. The %Recs of LCS/LCSDs were used to evaluate extraction efficiencies, overall analytical accuracy and analytical precision. No LCS/LCSD data were reported with the CAM-OR analytical SDGs.

Laboratory and blind field duplicate analyses are used as indicators of analytical precision within a given sample matrix. Laboratory duplicate data were not reported with the CAM-OR project SDGs. The following table presents the results of the field duplicate analyses:

Sample	Duplicate	Analyte	Sample Concentration (µg/l)	Duplicate Concentration (µg/l)	Relative Percent Difference
B-2	B-22 Dup	Trichloroethene	27J	28J	3.6
		cis-1,2-dichloroethene	630	650	3.1
		1,1-dichloroethene	140	140	0
MW-5S	MW-5S Dup	Trichloroethene	560J	600J	6.9
		Tetrahydrofuran	<50	65	NC

The field duplicate sample data exhibited reasonable agreement.

Calculations, transcriptions and chromatograms were spot-checked whenever sufficient data were provided by the laboratory.

As part of the analytical data validation, selected laboratory analytical data were qualified in accordance with standard criteria for data quality and usability. The qualifier codes used in this process included the following:

- "J" The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- "B" Analyte was identified; analyte detected in blank sample.

Based upon the results of the laboratory quality control, QA/QC samples and analytical data validation it is Dames & Moore's opinion that the analytical data associated with the CAM-OR project are acceptable for use as qualified, and that the data accurately represent concentrations in the environmental samples submitted to the laboratory.

## March 1996 Sampling Event

Investigative groundwater samples were analyzed by Savannah Laboratories of Savannah, Georgia as follows:

- 20 samples for volatile organic compounds (VOCs) by U.S. EPA SW-846 Method 8240; and,
- 16 samples for semivolatile organic compounds (SVOCs) by U.S. EPA SW-846 Method 8270.

Technical holding times were assessed by comparing the sampling dates with that of the preparation (extraction) dates and/or the analysis dates. The technical holding time requirements were met for all sample analyses.

Trip blanks (TBs) are carbon-free deionized water samples that accompany the investigative VOC samples during all stages of shipment, storage and analysis. Trip blanks are used to evaluate the potential for artificial introduction of VOCs into the investigative samples during the transportation and sample handling processes. Four trip blanks were reported; one with each of the four sample collection events. Methylene chloride was reported with sample delivery groups (SDGs) 81328 at 90 µg/l, 81367 at 120 µg/l and 81395 at 640 µg/l. All investigative samples with analyte concentrations less than that of the analyte concentration detected in the associated blank were qualified "U" (not-detected).<sup>1</sup>

Laboratory method blanks are blank air, water or soil samples prepared by the analytical laboratory and analyzed in the same fashion as the investigative samples. Water and soil laboratory method blanks were used to ensure that the investigative samples were not contaminated during the sample preparation, sample analysis or from a previous sample (instrument carry-over). All water laboratory method blanks were reported free of contamination.

Surrogate compounds are those compounds which are not expected to be detected in the investigative samples but which are chemically similar to analytes of interest. Surrogate compound percent recoveries (%Recs) were used to evaluate extraction efficiencies, possible matrix effects and overall analytical accuracy. All VOC sample surrogate compound %Recs were reported within the corresponding QC limits. All SVOC sample surrogate compound %Recs were reported within QC limits with the exception of sample MW-6S (Terphenyl d-14 = 24%; QC limits = 33 - 141%) and samples MW-2S, MW-2D, MW-3S, MW-3D and MW-3D Dup (all surrogates were diluted out of the corresponding QC limits). SVOC sample data are qualified based on surrogates only when two surrogates are recovered outside the corresponding QC limits per analytical fraction (i.e., acid or

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<sup>1</sup> The 5X or 10X rule, sample volume, and/or dilution factors must be taken into consideration when comparing sample concentration to that of the blank. (US EPA, February 1994)

base/neutral). This does not include instances in which the surrogates are diluted out due to sample dilution.

Matrix spikes are samples fortified (spiked) with known concentrations of analytes of interest. The %Recs of matrix spikes (MS) and matrix spike duplicates (MSD) were used to evaluate extraction efficiencies, possible matrix effects, overall analytical accuracy and analytical precision. Samples MW-1D MS and MW-1D MSD were collected and analyzed as a matrix spike duplicate pair in SDG 81367. All reported VOC and SVOC MS/MSD %Recs and relative percent differences (RPDs) were within the corresponding QC advisory limits.

Laboratory control samples (LCSs) and their duplicates (LCSDs), also known as blank or reagent spikes, are blank samples spiked with known concentrations of analytes of interest. The %Recs of LCS/LCSDs were used to evaluate extraction efficiencies, overall analytical accuracy and analytical precision. All reported LCS/LCSD %Recs and RPDs were within the corresponding QC limits.

Field duplicate analyses are used as indicators of analytical precision within a given sample matrix. The following table presents the results of the field duplicate analyses:

Sample	Duplicate	Analyte	Sample Concentration (µg/l)	Duplicate Concentration (µg/l)	Relative Percent Difference
MW-5D	MW-5D Dup	All VOCs	ND	ND	NA
MW-3D	MW-3D Dup	ALL VOCs	ND	ND	NA
MW-5D	MW-5D Dup	Bis(2-ethylhexyl)phthalate	64	64	0
MW-3D	MW-3D Dup	1,4-Dioxane	1200	900	28.6

The field duplicate sample data exhibited reasonable agreement.

Calculations, transcriptions and chromatograms were spot-checked whenever sufficient data were provided by the laboratory.

As part of the analytical data validation, selected laboratory analytical data were qualified in accordance with standard criteria for data quality and usability. The qualifier codes used in this process included the following:

- "U" The analyte was analyzed for, but was not detected above the reported detection limit.

Based upon the results of the laboratory quality control, QA/QC samples and analytical data validation it is Dames & Moore's opinion that the analytical data associated with the CAM-OR



project are acceptable for use as qualified, and that the data accurately represent concentrations in the environmental samples submitted to the laboratory.

### Off-site Groundwater Profiling

A quality assurance/quality control (QA/QC) review was performed on the organic analytical data associated with the CAM-OR project to assess the quality and usability of the data. The QA/QC review evaluated holding times, surrogate analyses, laboratory method blank analyses, laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses, continuing calibration verifications (CCVs) and one matrix spike/matrix spike duplicate (MS/MSD) analysis. The evaluation was based upon the *National Functional Guidelines for Organic Data Review* (US EPA, February, 1994), modified to include specific criteria of the individual analytical methods utilized for the CAM-OR project.

Investigative water samples were analyzed by National Environmental Testing, Inc. located in Indianapolis, Indiana for the following:

- Volatile organic compounds (VOCs) and tetrahydrofuran (THF) by U.S. EPA SW-846 Method 8260 (samples P30 100, P30 80, P30 60);
- Polynuclear aromatic hydrocarbons (PAHs) by U.S. EPA SW-846 Method 8270 (Samples P30 100, P30 80, P30 60); and,
- 1,4 - Dioxane by U.S. EPA SW-846 Method 8270 (samples P33 100, P33 80, P33 60, P31 100, P31 80, P31 60, P34 100, P34 80, P34 60, P35 100, P35 80, P35 60, P32 100, P32 80 and P32 60).

Technical holding times were assessed by comparing the sampling dates with that of the dates prepared (extracted) and/or the date analyzed. The technical holding time requirements were met for all samples. Detection limits associated with the non-detects in these samples were flagged "UJ" (undetected, estimated quantitation limit).

Surrogate compounds are those compounds which are not expected to be detected in the investigative samples but which are chemically similar to analytes of interest. Surrogate compound percent recoveries (%Recs) were used to evaluate extraction efficiencies, possible matrix effects and overall analytical accuracy. All surrogate compound %Recs were within the corresponding QC limits.

Laboratory method blanks are blank water samples prepared by the analytical laboratory and analyzed in the same fashion as the investigative samples. Water laboratory method blanks were used to ensure that the investigative samples were not contaminated during the sample preparation, sample analysis or from a previous sample (instrument carry-over). All laboratory method blanks were reported free of contamination.

Laboratory control samples (LCSs), also known as blank or reagent spikes, are blank samples spiked with known concentrations of analytes of interest. The %Recs and relative percent differences (RPDs) of LCSs and their duplicates (LCSDs) were used to evaluate extraction efficiencies, overall analytical accuracy and analytical precision. Although no control limits are established for LCS/LCSD accuracy and precision, the LCS/LCSD associated with samples P35 100, P35 80 and P35 60 showed poor precision (RPD = 51%) due to a low %Rec (58%) in the LCS. Detection limits of the non-detect results associated with these samples were qualified "UJ" (undetected, estimated quantitation limit).

QC limits were established for continuing calibration verifications (CCVs) to ensure that the instrument was capable of producing accurate quantitative data throughout each of the analyses. CCVs were reported by the laboratory for every calibration check compound (CCC) required by the specific method. All CCV %Recs were reported within the corresponding QC limits.

Matrix spikes (MSs) are samples fortified (spiked) with known concentrations of analytes of interest. The %Recs of MSs and matrix spike duplicates (MSDs) were used to evaluate extraction efficiencies, possible matrix effects, overall analytical accuracy and analytical precision. No MS/MSD samples were reported with any of the sample delivery groups (SDGs).

As part of the analytical data validation, selected laboratory analytical data were qualified in accordance with standard criteria for data quality and usability. The following code was used in this process:

- UJ The analyte was not detected above the reported detection limit. However, the reported detection limit is approximate and may or may not represent the actual limit of detection necessary to accurately and precisely measure the analyte in the sample.

Based upon the results of the laboratory quality control, QA/QC samples and analytical data validation, it is Dames & Moore's opinion that the analytical data associated with the CAM-OR project are acceptable for use as qualified, and the data accurately represent concentrations in the environmental samples submitted to the laboratory.

### On-Site Soil Characterization

A quality assurance/quality control (QA/QC) review was performed on the organic analytical data associated with the CAM-OR project to assess the quality and usability of the data. The QA/QC review evaluated holding times, surrogate analyses, laboratory method blank analyses, laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses, continuing calibration verifications (CCVs) and one matrix spike/matrix spike duplicate (MS/MSD) analysis. The evaluation was based upon the *National Functional Guidelines for Organic Data Review* (US EPA, February, 1994), modified to include specific criteria of the individual analytical methods utilized for the CAM-OR project.

Investigative soil samples were analyzed by National Environmental Testing, Inc. located in Indianapolis, Indiana for the following:

- Volatile organic compounds (VOCs) and tetrahydrofuran (THF) by U.S. EPA SW-846 Method 8260; and,
- Polyaromatic hydrocarbons (PAHs), 2-Picoline (TIC) and 1,4-Dioxane by U.S. EPA SW-846 Method 8270.

Technical holding times were assessed by comparing the sampling dates with that of the dates prepared (extracted) and/or the date analyzed. The technical holding time requirements were met for all samples except for the PAH extraction of samples DM-41 (4-8), DM-43 (8-12), and DM-44 (4-8). These samples were extracted one day after the expiration of the seven day holding time. No target compounds were reported in these samples. The detection limits of associated non detects were qualified "UJ" (undetected, estimated quantitation limits).

Surrogate compounds are those compounds which are not expected to be detected in the investigative samples but which are chemically similar to analytes of interest. Surrogate compound percent recoveries (%Recs) were used to evaluate extraction efficiencies, possible matrix effects and overall analytical accuracy. All surrogate compound %Recs were within the corresponding QC limits unless diluted out as a result of sample dilution.

Due to matrix interferences and/or high analyte concentrations, some samples were diluted resulting in increased detection limits.

Laboratory method blanks are blank water samples prepared by the analytical laboratory and analyzed in the same fashion as the investigative samples. Water laboratory method blanks were used to ensure that the investigative samples were not contaminated during the sample preparation, sample analysis or from a previous sample (instrument carry-over). All laboratory method blanks were reported free of contamination.

Laboratory control samples (LCSs), also known as blank or reagent spikes, are blank samples spiked with known concentrations of analytes of interest. The %Recs and relative percent differences (RPDs) of LCSs and their duplicates (LCSDs) were used to evaluate extraction efficiencies, overall analytical accuracy and analytical precision. All LCS/LCSD %Recs and RPDs were reported within the corresponding QC limits with the exception of the vinyl chloride LCS %Rec (55%) associated with Run Batch #38. All associated positive and non-detect results were qualified "J" (estimated) and "UJ" (undetected, estimated quantitation limit), respectively.

QC limits were established for continuing calibration verifications (CCVs) to ensure that the instrument was capable of producing accurate quantitative data throughout each of the analyses. CCVs were reported by the laboratory for every calibration check compound (CCC) required by the specific method. All CCV %Recs were reported within the corresponding QC limits.

Matrix spikes (MSs) are samples fortified (spiked) with known concentrations of analytes of interest. The %Recs of MSs and matrix spike duplicates (MSDs) were used to evaluate extraction efficiencies, possible matrix effects, overall analytical accuracy and analytical precision. Two samples from this project underwent MS/MSD analyses. Chlorobenzene was recovered below the control limits established by the *National Functional Guidelines* in the MS/MSD (55% and 50%, respectively) associated with sample delivery groups (SDGs) 96.04232 and 96.04231. In addition, seven out of ten volatile MS/MSD %Recs were reported below the QC limits set forth in the *National Functional Guidelines*. These MS/MSD results indicate that, in some samples, there may be a matrix interference causing a low bias in the aromatic volatile results. However, in light of the acceptable surrogate and LCS results, no data were qualified based on the MS/MSD results.

As part of the analytical data validation, selected laboratory analytical data were qualified in accordance with standard criteria for data quality and usability. The following code was used in the process:

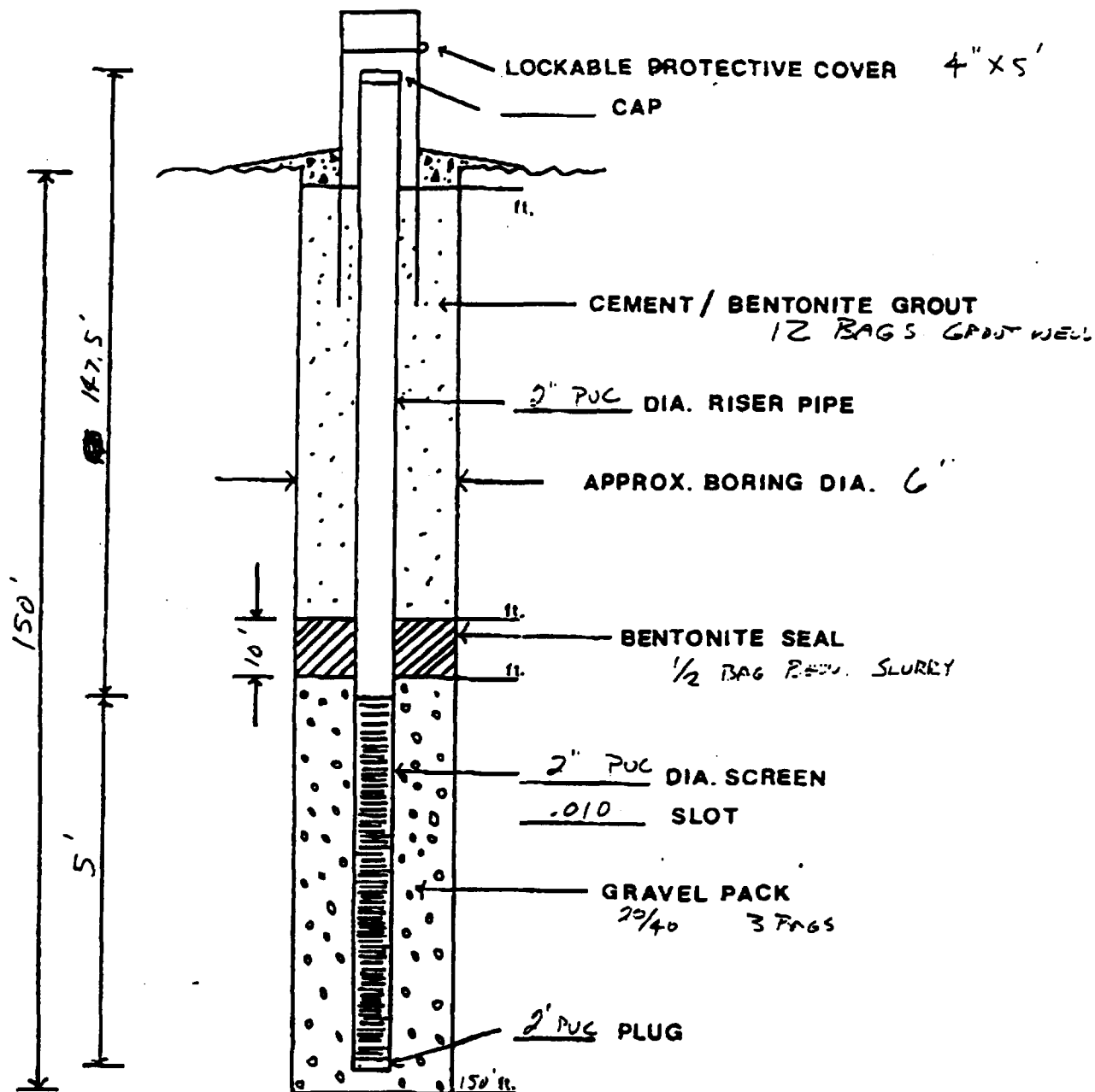
- UJ            The analyte was not detected above the reported detection limit. However, the reported detection limit is approximate and may or may not represent the actual limit of detection necessary to accurately and precisely measure the analyte in the sample.

Based upon the results of the laboratory quality control, QA/QC samples and analytical data validation, it is Dames & Moore's opinion that the analytical data associated with the CAM-OR project are acceptable for use as qualified, and that the data accurately represent concentrations in the environmental samples submitted to the laboratory.

**APPENDIX F**

**WELL CONSTRUCTION LOGS**

WELL NUMBER MW-5D



LOCATION:

CAM-OR

WESTVILLE, INC.

DAMES & MOORE

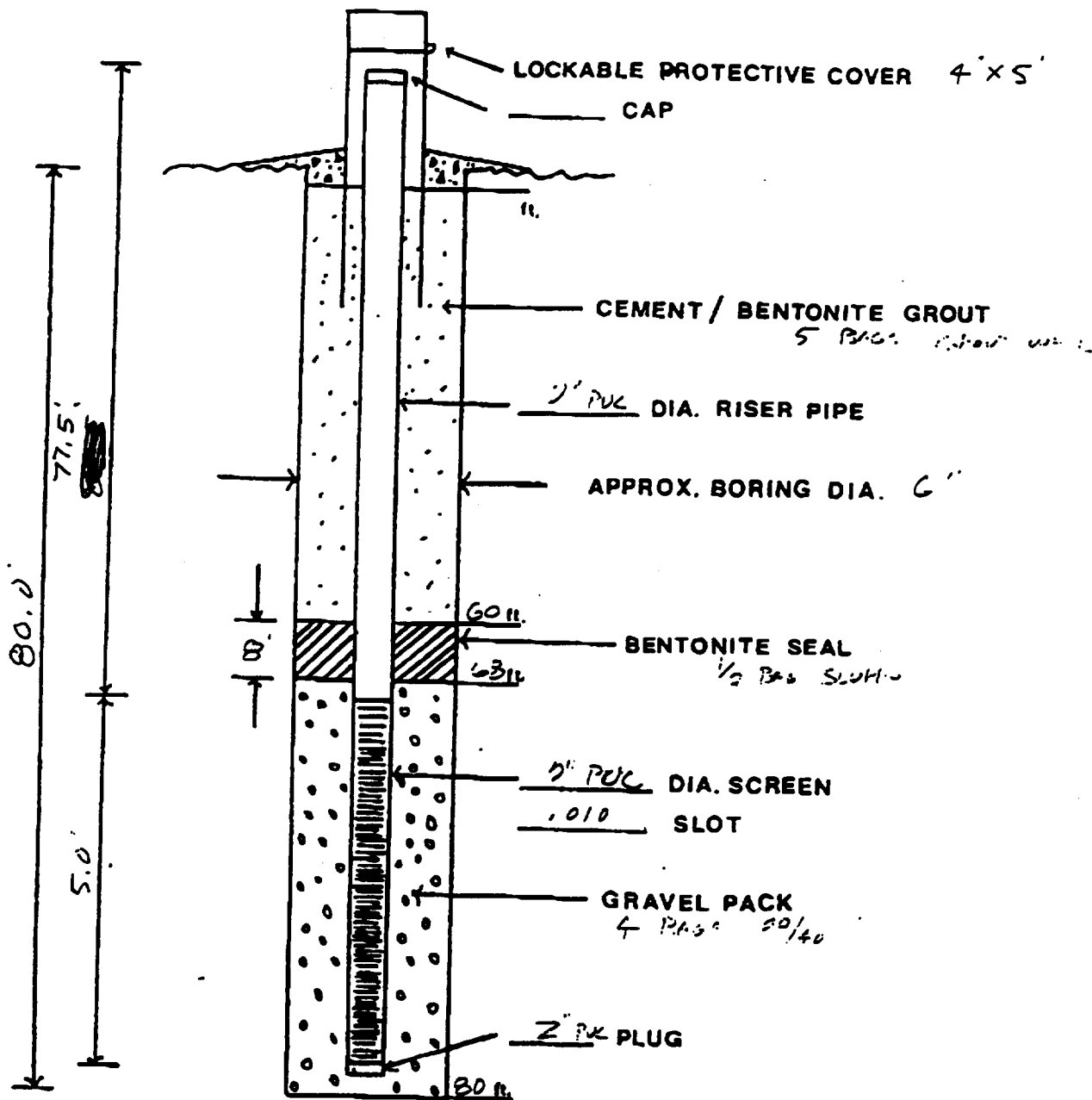
661650

TYPICAL MONITOR WELL

LAYNE-WESTERN COMPANY, INC.

WELL NUMBER

MW-5E



LOCATION:

CAM-OR

WESTVILLE, INC.

DAMBO, MOORE

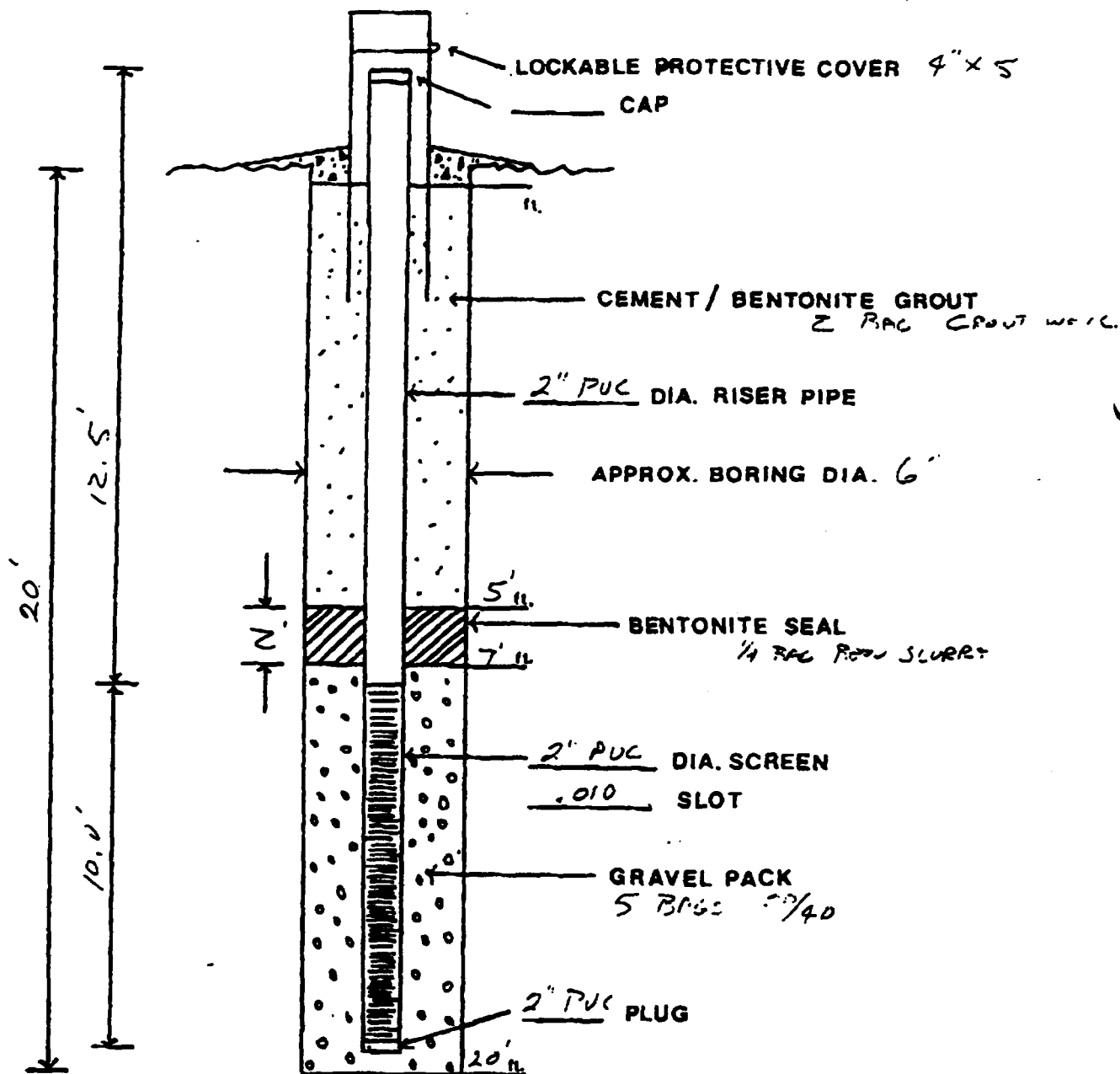
661650

TYPICAL MONITOR WELL

LAYNE-WESTERN COMPANY, INC.

WELL NUMBER

MW-55



LOCATION:

CARL-OR

WESTVILLE IND.

DAMS & MOORE

1061650

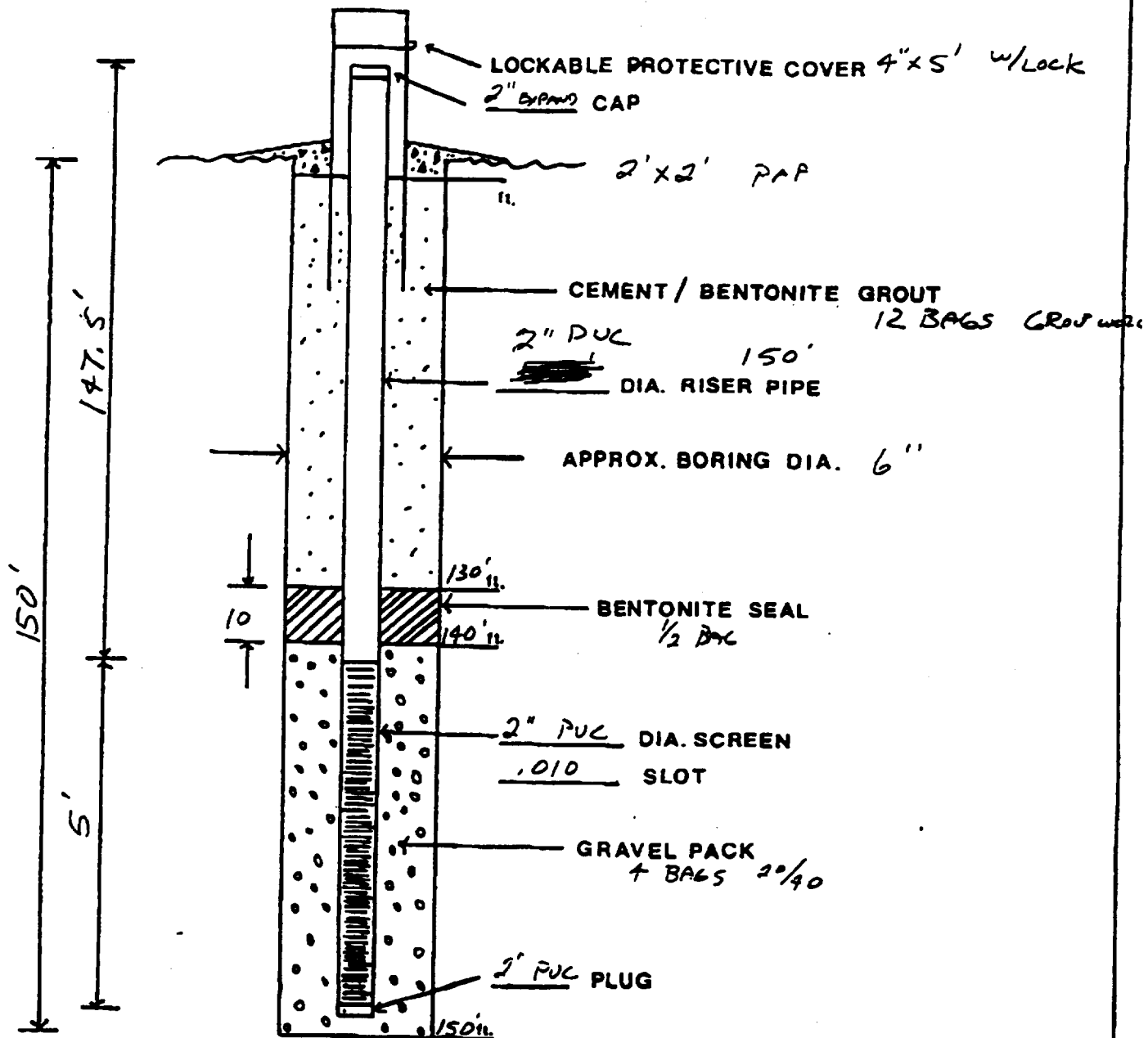
TYPICAL MONITOR WELL

LAYNE-WESTERN COMPANY, INC.



WELL NUMBER

MW-4D



LOCATION:

CAM - OR

WESTVILLE IND.

PAMES & MOORE

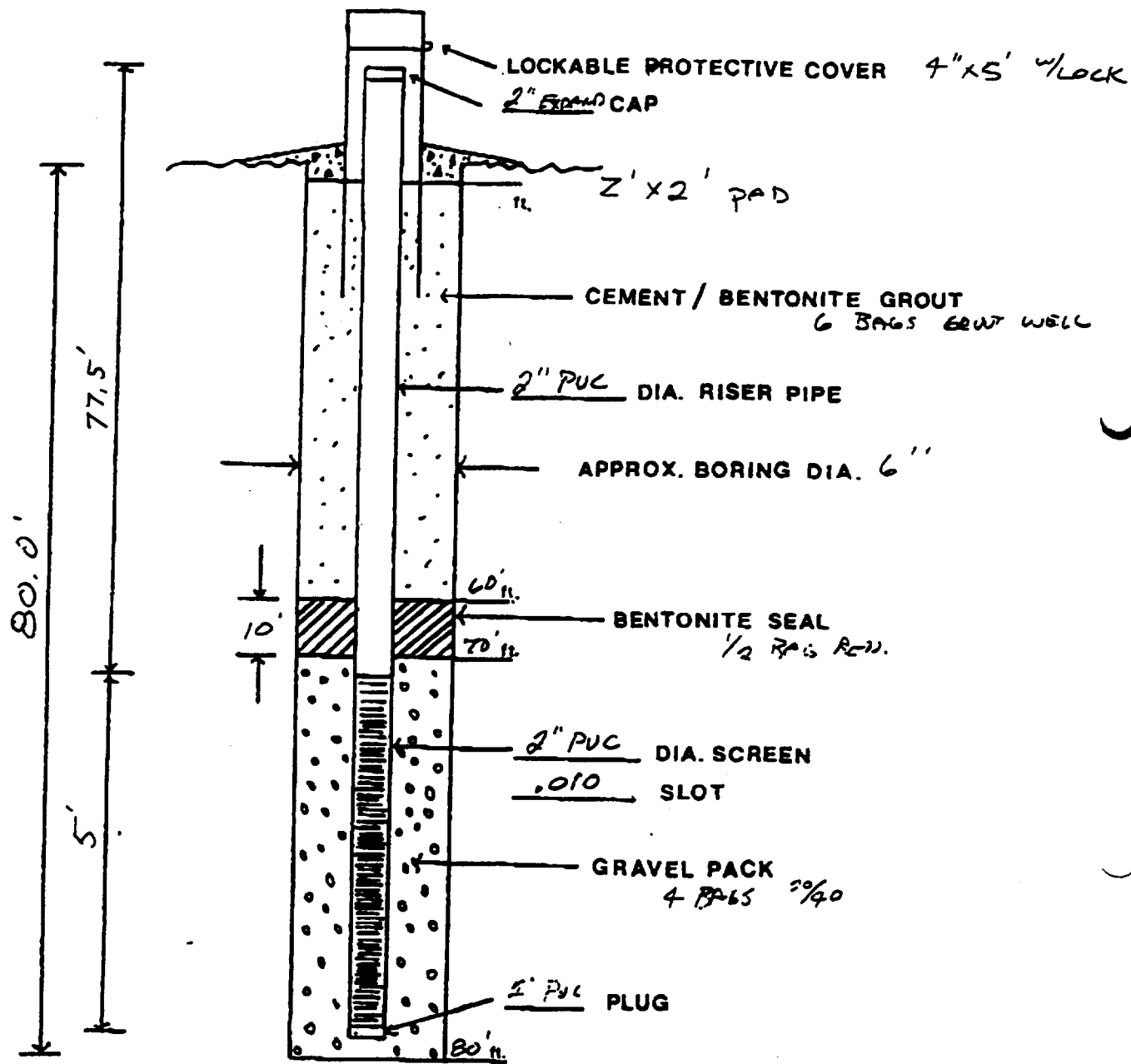
JOB # 661650

TYPICAL MONITOR WELL

LAYNE-WESTERN COMPANY, INC.

WELL NUMBER

MW-4E



LOCATION:

CAM-OR

WESTVILLE IND.

DAMES & MOORE

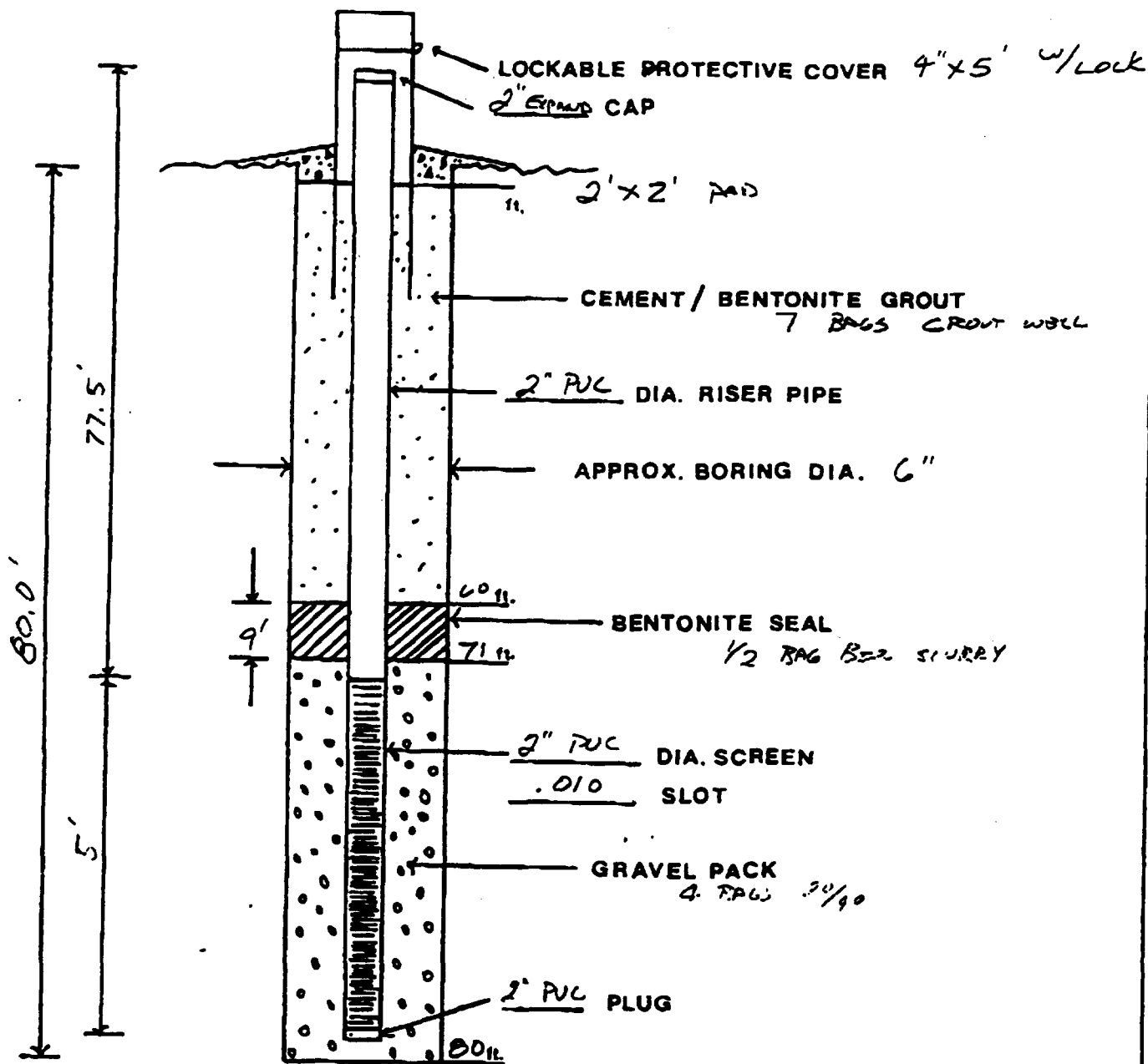
661650

TYPICAL MONITOR WELL

LAYNE-WESTERN COMPANY, INC.

WELL NUMBER

MW-6I



LOCATION:

CAM-OR

WESTVILLE, IN.

DANIEL E. MOORE

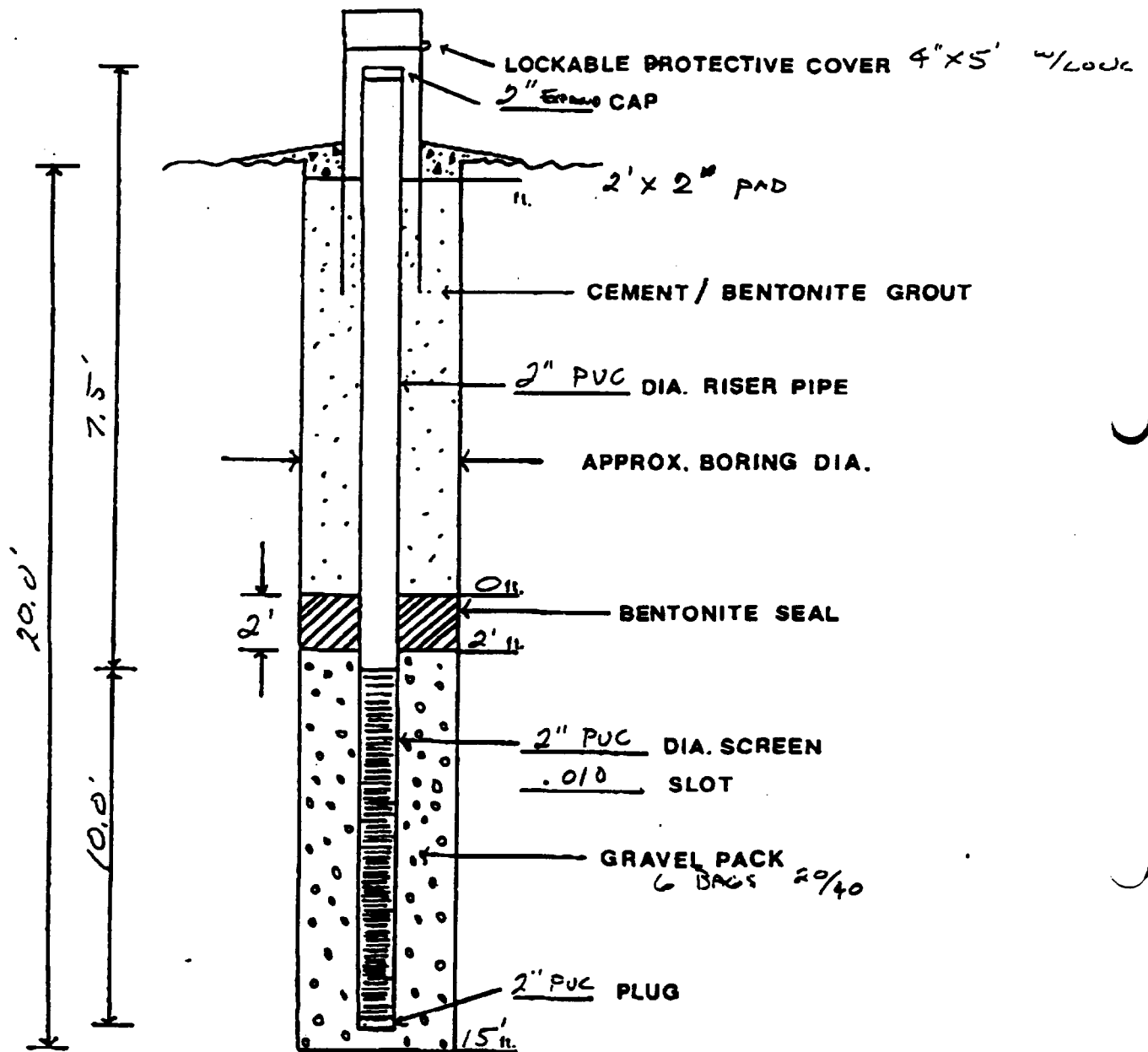
JOB # 601150

TYPICAL MONITOR WELL

LAYNE-WESTERN COMPANY, INC.

WELL NUMBER

MW-45



LOCATION:

CAM-OR

WESTVILLE, IND.

DAMES & MOORE

JOB # 661650

TYPICAL MONITOR WELL

LAYNE-WESTERN COMPANY, INC.